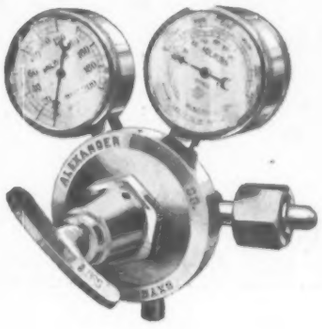
The Welding Engineer

Reg. U. S. Pat. Office

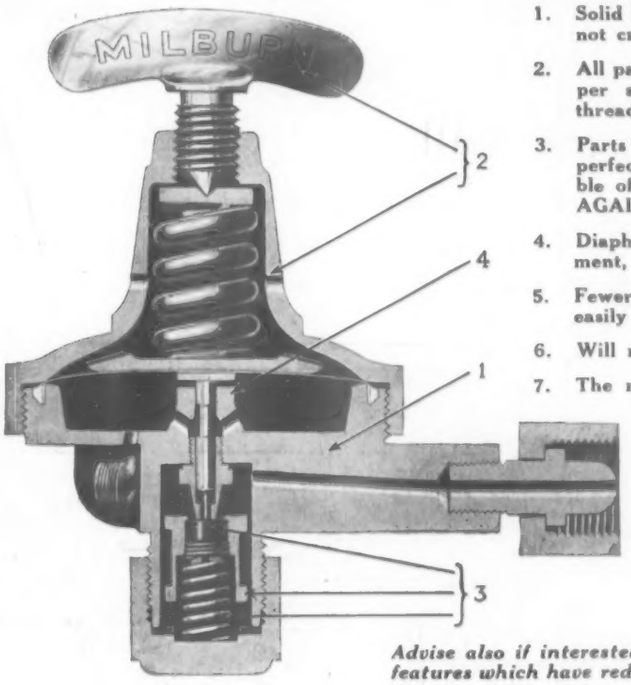
Founded by L. B. Mackenzie, 1916

SEPTEMBER, 1928 VOL. 13, NO. 9

$3.00 per year in U. S. 608 S. Dearborn St., Chicago, Ill. $4.00 per year abroad



This "Constant Pressure" Regulator Reduces Your Operating Cost



Special features which have caused the Milburn Regulator to be standardized by leading users of cutting and welding equipment the world over.

1. Solid bronze forging—bridge-like construction. Cannot crush in.
2. All parts forged bronze—tensile strength, 60,000 lbs. per square inch—make permanent, non-stripping threads.
3. Parts telescopic, covered by patent rights, giving perfectly aligned seat. Seat the most easily accessible of any regulator made—Seats WITH instead of AGAINST the pressure.
4. Diaphragm movement, limited by patented abutment, cannot be strained or inverted.
5. Fewer parts than other regulators and all parts easily get-at-able.
6. Will not stick or freeze.
7. The most glaring fault of many regulators is their inability to keep up the desired volume and pressure as the high initial pressure diminishes. This affects cutting and welding efficiency and economy. The Milburn Regulator overcomes this fault. In spite of diminishing initial pressure, the Milburn will maintain or increase the delivery pressure.

Write for details of complete line of regulators. Ask for Bulletin 359.

Advise also if interested in cutting and welding torches with special features which have reduced the cost of operations 20% and upwards.

THE ALEXANDER MILBURN COMPANY

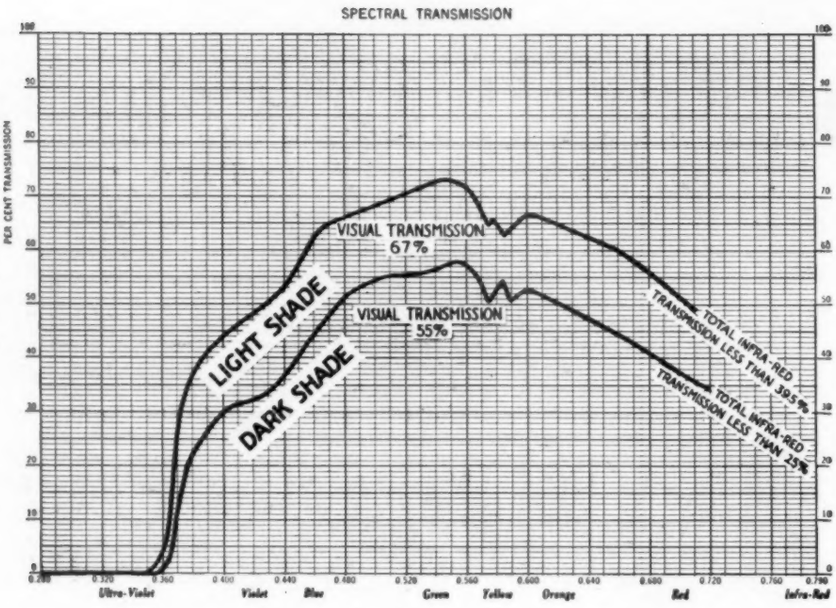
1416-1428 W. Baltimore St. BALTIMORE, MD.

ESTABLISHED 1907

Manufacturers of the World's Best Welding and Cutting Equipment

Published monthly by the Welding Engineer Publishing Co. Entered as second class matter Jan. 20, 1916, at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

With Calobar glass you get a high percentage of the helpful light and eliminate the harmful infra-red and ultra-violet.



The high visibility with Calobar glass shows all colors in their true value.

CALOBAR GLASS

FOR FORGE AND FURNACE GOGGLES

Complete Eye Protection

CALOBAR glass is made in two shades, to scientifically protect furnace and forge workers' eyes from glare and heat. Not only the soft, restful color of this glass, but its chemical properties, reduce strong light to safe proportions before it enters the eye.

In the Spectral Transmission chart above, it will be seen how the ultra-violet and infra-red rays in light are filtered by Calobar glass. These are the injurious rays encountered by men working at forge and furnaces, where high temperature produces excessive quantities of heat and light.

Prices

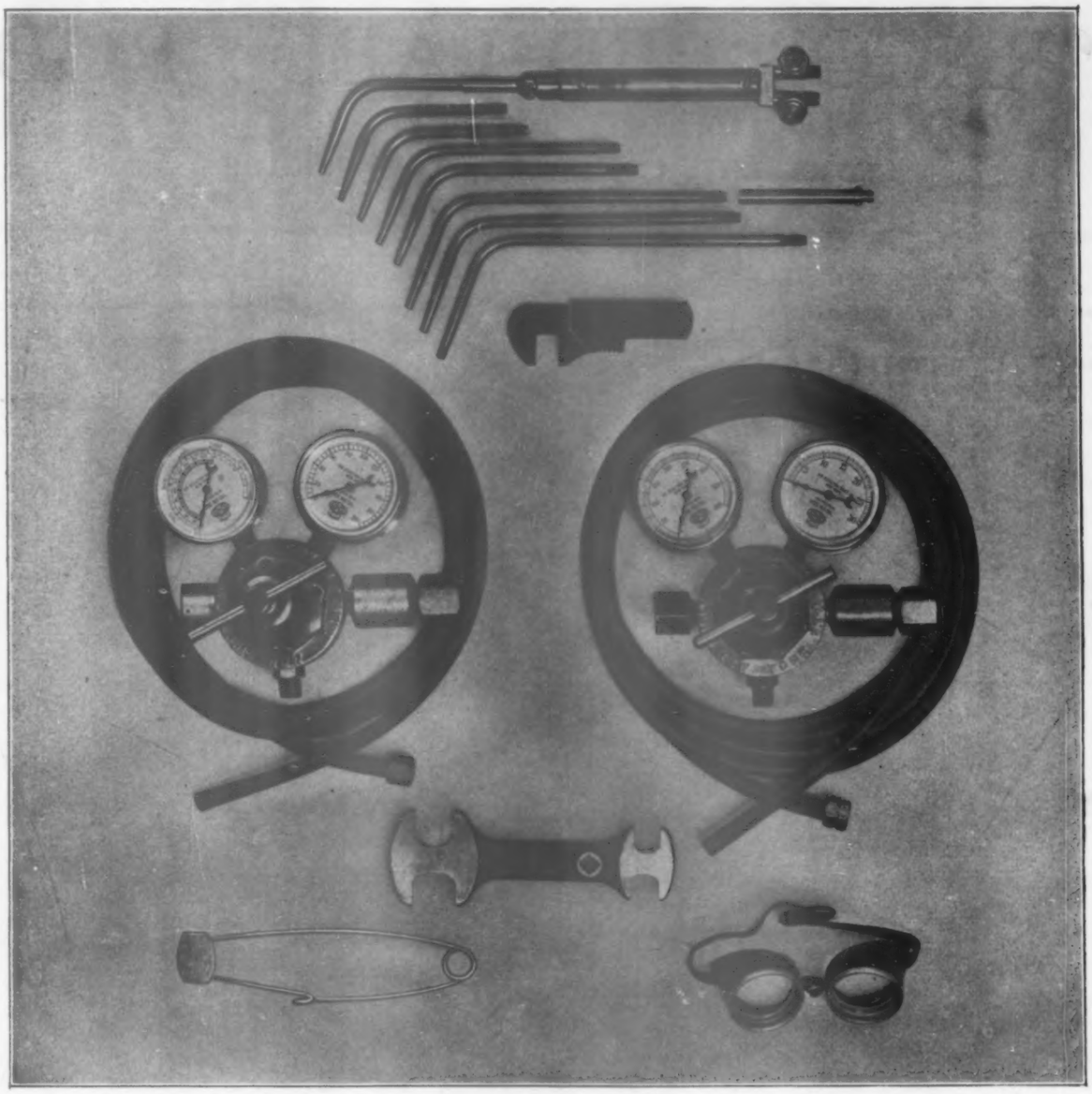
	List	Lots 100
Furnace goggle with Calobar lenses	$3.00	$2.75
Lenses 47 mm or less	1.50	1.25 per pr.
Lenses 50 mm	2.00	1.50 per pr.
Plates 2 x 4¼	2.75	2.00 each
Plates Sq. inch	.35	.25

Furnace Goggle with Calobar Lenses

AMERICAN OPTICAL COMPANY

NEW YORK — ST. LOUIS — SAN FRANCISCO — CHICAGO — KANSAS CITY — ATLANTA

Goggles for Every Industrial Need



For Light and Medium Welding
A New Airco-Davis-Bournonville Outfit No. 89

Simplified design and low price
New Style 8900 Torch of minimum weight and maximum efficiency
New Style 8201 and 8202 Pressure Regulators with 2½-in. gauges.

Address any Airco office for catalog and particulars of new line.

AIR REDUCTION SALES COMPANY

Manufacturers and distributors of Airco Oxygen, Airco Acetylene, Airco National Carbide
Airco-Davis-Bournonville Welding and Cutting Apparatus and Welding Supplies

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AIRCO — DAVIS BOURNONVILLE

66 Plants — *Home Office*—342 Madison Avenue, New York City, N. Y. — 21 District Offices

"RACO" RED LABEL ROD

was used exclusively for welding the steel construction

in the Ryan plane

"THE SPIRIT OF ST. LOUIS"

B. F. MAHONEY AIRCRAFT CORP.
SAN DIEGO, CALIFORNIA
FEBRUARY 15 1928
Reid-Avery Company,
21st & Washington Ave.,
Philadelphia, Pa.
Gentlemen:
Subject: Red Label Welding Rod.
We have been using Red Label welding rod supplied by you for the past year and a half in the construction of our Ryan monoplanes. This rod is used for welding up steel tubing in the fuselage frame, ailerons, tail surfaces and landing gear.
This rod was used exclusively for welding the steel construction in the Ryan plane "The Spirit of St. Louis" which we built for Colonel Lindbergh, and in which he has since flown many thousands of miles with no report of failure in any welded joint.
We take pleasure in stating that your rod has been checked against a number of different makes and has proved to be the best suited for the particular kind of work which we are doing.
Very truly yours,
B. F. MAHONEY AIRCRAFT CORPORATION
(owners of Ryan Airlines)
Walter O. Locke
Walter O. Locke
Production Engineer
WOL:C
N-211

Manufacturers of

OXY-ACETYLENE WELDING RODS

ELECTRIC WELDING RODS

"RACO" COMPOSITE WIRE FOR AUTOMATIC ELECTRIC ARC WELDING

America's Standard

REID-AVERY CO., *Inc.*, PHILADELPHIA

The Welding Engineer

Founded by L. B. Mackenzie, 1916

Volume 13 | September 1928 | Number 9

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The Needs of Men in the Market

FROM the message of Dr. Hollis Godfrey, President of the Engineering Economics Foundation, Boston, to the convention of the International Advertising Association held at Detroit this summer, we quote a couple of particularly interesting paragraphs:

"The agencies for organizing the facts in teaching form and transmitting them are known. The primary agencies in organizing and transmitting facts concerning business are the college and the business paper. Alone among the agencies of transmission, these institutions are self-correcting as regards facts. The academic world questions every statement of the college. The reader questions every statement of the business paper, as regards both fact and the timeliness of fact. These conditions are true of no other agencies of transmission of fact."

"One group of business papers, the Associated Business Papers, with 128 member publications, organized with education as a primary object, has after many months of study adopted a policy of general adult education to be developed through their papers in terms of the buyer's market and of the use of wealth. This group of publications has related the capacities for creating wealth in the buyer's market to the needs of men in that market."

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Last Advertising forms close at 8:00 a. m. on the 12th. To show proof for correction copy must be received at an earlier date and allowances should be made for delay to mails. All copy should be in by the 12th of the month at the latest.

The Welding Engineer does not publish in its news or advertising columns any matter that deals with or refers to either personal or legal controversies.

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Buyers' Index

Readers of The Welding Engineer will find this index to contain the most accurate information obtainable relating to welding apparatus and supplies. The advertising section includes the principal manufacturers of the United States.

ACETYLENE (Compressed in Cylinders)
Air Reduction Sales Co.
Commercial Acetylene Supply Co.
International Oxygen Co.
Prest-O-Lite Co.

ACETYLENE CYLINDERS
Keith Dunham Company
Pressed Steel Tank Co.

AIR LIQUEFACTION OXYGEN PRODUCING PLANTS
Keith Dunham Company
Heylandt Sales Co.

ALUMINO-THERMIC WELDING
Metal & Thermit Corporation

ALUMINUM SOLDER
Crown Aluminum Solder Co.
Miller Aluminum Solder Co.
Weldene Corporation

ANNEALING FURNACES
General Electric Co.
Westinghouse Elec. & Mfg. Co.

APRONS (Asbestos)
Ideal Face Shield Co.

ASBESTOS INSULATED WIRE AND CABLE
Central Steel & Wire Co.

BLOW PIPES
See "Torches."

BOOKS
The Welding Engineer Pub. Co.
Electric Arc Cutting & Welding Co.

BRAZING OUTFITS
Air Reduction Sales Co.
American Oxygen Service Co.
Bastian-Blessing Co.
Buckeye Oxygen Co.
Craftsweld Equipment Co.
Harris Calorific Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Alexander Milburn Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.
Williams & Co.

BRONZE FILLER RODS
American Brass Co.
Central Steel & Wire Co.
Krembs & Co.
Mueller Brass Co.
Steel Sales Corp.

BUFFERS
Biax Flexible Shaft Co.
R. G. Haskins Co.
N. A. Strand & Co.

BUTT WELDERS
See "Electric Resistance Welders"

CABLE (Arc Welding)
Allan Mfg. & Welding Co.
Central Steel & Wire Co.
Electric Arc Cutting & Welding Co.
General Electric Co.
Gibb Welding Machines Co.
C. H. Hollup Corp.
Lincoln Electric Co.
Quasi-Arc Weldtrode Co.
Una Welding and Bonding Co.
U. S. L. Battery Corp.
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

CARBIDE
Air Reduction Sales Co.
National Carbide Co.
Shawinigan Products Corp.
Union Carbide Sales Co.

CARBON (Blocks, Paste, Electrodes, etc.)
Air Reduction Sales Co.
Central Steel & Wire Co.
Electric Arc Cutting & Welding Co.
National Carbon Co.
Oxweld Acetylene Co.

CARBON BURNING EQUIPMENT
Air Reduction Sales Co.
Bastian-Blessing Co.
Craftsweld Equipment Co.
Harris Calorific Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Milburn, Alexander Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.

CAST IRON SOLDER
Crown Aluminum Solder Co.
Weldene Corporation

CAUSTIC POTASH
Innis, Speiden & Company

CONSULTING ENGINEER
E. F. Hollinger
R. E. Kinkead
R. C. Pierce

CONTRACT WELDERS
S. O. S. Welding Corp.

CUTTING ELECTRODES (Electric Arc)
Allan Mfg. & Welding Co.
Electric Arc Cutting & Welding Co.
General Electric Co.
Lincoln Electric Co.
National Carbon Co.
Una Welding and Bonding Co.
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

CYLINDERS (Acetylene)
Keith Dunham Company
Pressed Steel Tank Co.

CYLINDERS (Oxygen, Hydrogen)
Chas. L. Gulick.
Wm. Wharton, Jr. Co.
Harrisburg Pipe & Pipe Bending Co.

DRILLS, PORTABLE ELECTRIC
Biax Flexible Shaft Co.
R. G. Haskins Co.
Stoody Company
N. A. Strand & Co.

ELECTRIC ARC WELDING OUTFITS
Allan Mfg. & Welding Co.
Burke Electric Co.
Chicago Steel & Wire Co.
Electric Arc Cutting & Welding Co.
Electric Welding Machine Co.
Fusion Welding Corporation
General Electric Co.
Goodman Electric Machinery Co.
Gibb Welding Machines Co.
C. H. Hollup Corp.
Lincoln Electric Co.
E. A. Lundy Co.
Northwestern Mfg. Co.
Owen Electric Mfg. Co.
Quasi-Arc Incorporated
Stoody Co.
Una Welding and Bonding Co.
Welding Service Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co.
Wilson Welder & Metals Co.

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Federal Machine & Welder Co.
General Electric Co.
Gibb Welding Machines Co.
Goodman Electric Machinery Co.
R. D. Thomas Co.
Welding Appliance Co.

ELECTRODES (Carbon Arc Welding)
See "Cutting Electrodes"

ELECTRODES (Metallic Arc Welding)
American Steel Engineering Co.
American Steel & Wire Co.
Atlas Foundry Co.
Central Steel & Wire Co.
Chicago Steel & Wire Co.
Electric Arc Cutting & Welding Co.
Fusion Welding Corporation
General Electric Co.
Gibb Welding Machines Co.
C. H. Hollup Corporation
Koro Corporation
Lincoln Electric Co.
Page Steel & Wire Co.
Quasi-Arc Incorporated
Reid-Avery Co.
Roebling, John A., Sons Co.
Seneca Wire Mfg. Co.
Standard Steel & Wire Co.
Steel Sales Corp.
Stoody Company
Una Welding and Bonding Co.
Welding Service Co.
Wickwire Spencer Steel Corp.
Williams & Co.
Wilson Welder & Metals Co.

ELECTRODE HOLDERS
Allan Mfg. & Welding Co.
Burke Electric Co.
Chicago Steel & Wire Co.
Electric Welding Machine Co.
Fibre-Metal Products Co.
Fusion Welding Corporation
General Electric Co.
Gibb Welding Machines Co.
C. H. Hollup Corp.
Koro Corporation.
Lincoln Electric Co.
Northwestern Mfg. Co.
Owen Electric Mfg. Co.
Stoody Co.
Waters Arc Welding Corporation
Welding Service Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co.
Wilson Welder & Metals Co.

ELECTRODE TIPS (Resistance Welding)
Elkon Works, Inc.

ELECTROLYTIC OXYGEN AND HYDROGEN GENERATING EQUIPMENT
International Oxygen Co.

FACE SHIELDS (Arc Welding)
Allan Mfg. Co. & Welding Co.
American Optical Co.
Burke Electric Co.
Central Steel & Wire Co.
Chicago Eye Shield Co.
Electric Arc Cutting & Welding Co.
Fibre-Metal Products Co.
General Electric Co.
Gibb Welding Machines Co.
C. H. Hollup Corp.
Ideal Face Shield Co.
Lincoln Electric Co.
Northwestern Mfg. Co.
Owen Electric Mfg. Co.
Quasi-Arc Incorporated
Stoody Company
Una Welding and Bonding Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co.
Wilson Welder & Metals Co.
Willson Goggles, Inc.

FILLER RODS
Air Reduction Sales Co.
American Brass Co.
American Steel Engineering Co.
American Steel & Wire Co.
Atlas Foundry Co.
Central Steel & Wire Co.
Craftsweld Equipment Co.
Fusion Welding Corporation
C. H. Hollup Corp.
Imperial Brass Mfg. Co.
Krembs & Co.
Mueller Brass Co.
Koro Corporation
Oxweld Acetylene Co.
Page Steel & Wire Co.
Reid-Avery Co.
Roebling, John A., Sons Co.
Seneca Wire Mfg. Co.
St. Paul Welding & Mfg. Co.
Standard Steel & Wire Co.
Steel Sales Corp.
Stoody Co.
Stulz-Sickles Co.
Torchweld Equipment Co.
Welding Service Co.
Wickwire Spencer Steel Corp.
Weldit Acetylene Co.
Williams & Co.

FIREPROOF PLASTIC MATERIAL
Air Reduction Sales Co.
Joseph Dixon Crucible Co.
National Carbon Co.

FLUE WELDERS (Electric)
General Electric Co.

FLUXES
Air Reduction Sales Co.
Anti-Borax Compound Co.
Metal & Thermit Corp.
Central Steel & Wire Co.
Gold Seal Mfg. Co.
Krembs & Co.
Modern Engineering Co.
Momac Sales Co.
Oxweld Acetylene Co.
St. Paul Welding & Mfg. Co.
Simplex Flux and Solder Co.
Torchweld Equipment Co.
Weldene Corporation
Weldit Acetylene Co.

GAS SAVING DEVICES
Harris-Calorific Co.
Weldit Acetylene Co.

There's a Grade (analysis) of WILSON WIRE for *every arc-welding job*

Above: One of several arc-welded stacks at the Edison Plant, 14th Street and East River, New York, on which Wilson Grade No. 17 (patented U. S. A., June 13, 1916; March 9, 1920) was used. Each stack is 256 feet high and 22½ feet in diameter, and contains 7000 feet (1½ miles) of arc-welding.

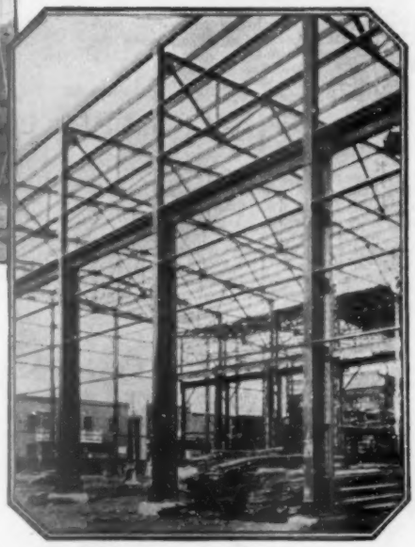
SUCCESSFUL arc-welding demands the RIGHT wire for the *particular* metal which is to be welded. For instance, steel requires one analysis of wire; machineable welds on cast-iron another; and bronze, still another. And again, the purpose of the weld further determines the analysis required. Boiler work, where tensile strength is the vital factor, requires one analysis of wire; and rail heads, where hardness is of first importance, requires another analysis.

Wilson has developed a correct Grade (analysis) of wire for practically every welding purpose—each designated by a color, hence *"Color-tipt."* And every Grade of Wilson is *uniform throughout.*

Above: Showing the Ohio Bell Telephone Building, Cleveland, and welder at work on one of the 16-inch Steam Risers that feed fifteen stories of the building. After exhaustive laboratory tests, Wilson Wire was chosen for every weld on this job. Wilson Grade No. 6 (patented U. S. A., June 13, 1916; March 9, 1920; Canada, March 19, 1918) and Wilson Grade No. 9 (Pat. U. S. A., June 13, 1916; March 9, 1920) were used.

Above: In the Fletcher Shipyard, Hoboken, N. J., welding a cast steel Contra-Propeller to a rudder post with Wilson Grade No. 17.

Left: One of the battery of Vacuum Reservoirs, welded with Wilson Grade No. 6 by G. D. Peters & Co., Ltd., Slough, England.



Right: Showing part of a Steel Structure which was welded with Wilson Wire. Grade No. 17 Bare Wire was used on this job.

Learn for yourself the superiority of Wilson Wire. Tell us the kind of welding you want to do, and we will send you a sample of the correct Grade.

WILSON WELDER & METALS CO. INC., 20 WILSON BUILDING, HOBOKEN, N. J.

See our Exhibit NATIONAL METAL EXPOSITION *Philadelphia* October 8—12

WILSON

See our Exhibit NATIONAL METAL EXPOSITION *Philadelphia* October 8—12

WELDING MACHINES AND WELDING WIRE

GLOVES (Asbestos)
Ideal Face Shield Co.
GAUGES
Moto Meter Co.
National Gauge & Equipment Co.
GENERATORS (Acetylene)
Air Reduction Sales Co.
Bastian-Blessing Co.
Craftsweld Equipment Co.
Harris Calorific Co.
M. Keith Dunham
Imperial Brass Mfg. Co.
Milburn, Alexander Co.
Modern Engineering Co.
Oxweld Acetylene Co.
GLOVES
Morrison-Ricker Mfg. Co.
GOGGLES
American Optical Co.
Chicago Eye Shield Co.
Ideal Face Shield Co.
Willson Goggles, Inc.
GRAPHITE (Rods, Blocks, Paste, Etc.)
Joseph Dixon Crucible Co.
GRINDERS (Portable Electric)
Biax Flexible Shaft Co.
R. G. Haskins Co.
Stoody Company.
N. A. Strand & Co.
HELMETS (Arc Welding)
Allan Mfg. & Welding Co.
American Optical Co.
Burke Electric Co.
Central Steel & Wire Co.
Chicago Eye Shield Co.
Electric Arc Cutting & Welding Co.
Fibre-Metal Products Co.
Fusion Welding Corporation
General Electric Co.
Gibb Welding Machines Co.
C. H. Hollup Corp.
Ideal Face Shield Co.
Lincoln Electric Co.
Northwestern Mfg. Co.
Owen Electric Mfg. Co.
Quasi-Arc Incorporated
Westinghouse Elec. & Mfg. Co.
Williams & Co.
Wilson Welder & Metals Co.
Willson Goggles, Inc.
HOSE COUPLINGS
Carl A. Norgren Co.
See also under "Needle Valves"
HYDROGEN
Gas Products Association
International Oxygen Co.
HYDROGEN GENERATING PLANTS
International Oxygen Co.
LEAD WELDING UNITS
Air Reduction Sales Co.
Bastian-Blessing Co.
Craftsweld Equipment Co.
Harris Calorific Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Modern Engineering Co.
Milburn, Alexander, Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.
Weldit Acetylene Co.
LIGHTERS (For Gas Torches)
Air Reduction Sales Co.
Bastian-Blessing Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Matchless Utilities Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Safety Gas Lighter Co.
Shoot-a-Lite Corporation.
Torchweld Equipment Co.
MANIFOLDS
Air Reduction Sales Co.
Bastian-Blessing Co.
Craftsweld Equipment Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.
MECHANICALLY OPERATED CUTTING AND WELDING TORCHES
Air Reduction Sales Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
MOLDING MATERIAL
See "Fire Proof Plastic Material"
MONEL METAL RODS AND ELECTRODE
Central Steel & Wire Co.
Wilson Welder & Metals Co.
NEEDLE VALVES
Air Reduction Sales Co.
Bastian-Blessing Co.
Harris Calorific Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.
NICHROME WELDING WIRE
Driver-Harris Co.
NITROGEN
Air Reduction Sales Co.
Gas Products Association
Linde Air Products Co.
International Oxygen Co.
OXYGEN
Air Reduction Sales Co.
American Oxygen Service Co.
Buckeye Oxygen Co.
Gas Products Association
International Oxygen Co.
Linde Air Products Co.
OXYGEN PRODUCTION PLANTS
Keith Dunham Company
Heylandt Sales Co.
PORTABLE ARC WELDING OUTFITS (Mounted on Trucks)
General Electric Company
Shrader Electric Company
PREHEATING DEVICES AND OVENS
Imperial Brass Mfg. Co.
Metal & Thermit Corp.
St. Paul Welding & Mfg. Co.
RAIL BONDS
Una Welding and Bonding Co.
RAIL JOINT WELDERS
Una Welding and Bonding Co.
REAMERS (Portable Electric)
R. G. Haskins Co.
N. A. Strand & Co.
REGULATORS
Air Reduction Sales Co.
Bastian-Blessing Co.
American Oxygen Service Co.
Buckeye Oxygen Co.
Craftsweld Equipment Co.
Fusion Welding Corporation
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
St. Paul Welding & Mfg. Co.
Stoody Company
Torchweld Equipment Co.
Victor Oxy-Acetylene Equipment Co.
Weldit Acetylene Co.
Williams & Co.
SCHOOLS
Illinois Welding Works.
SEAM WELDERS
See "Electric Resistance Welders"
SILVER SOLDER
Handy & Harman
SWEDISH IRON WELDING WIRE
Bissett Steel Co.
SPOT WELDERS
See "Electric Resistance Welders"
TANK CONNECTIONS
Air Reduction Sales Co.
Bastian-Blessing Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.
THERMIT WELDING
Metal & Thermit Corp.
TORCHES (Welding and Cutting)
Air Reduction Sales Co.
American Oxygen Service Co.
Buckeye Oxygen Co.
Craftsweld Equipment Co.
Bastian-Blessing Co.
Fusion Welding Corporation
Harris Calorific Co.
Imperial Brass Mfg. Co.
International Oxygen Co.
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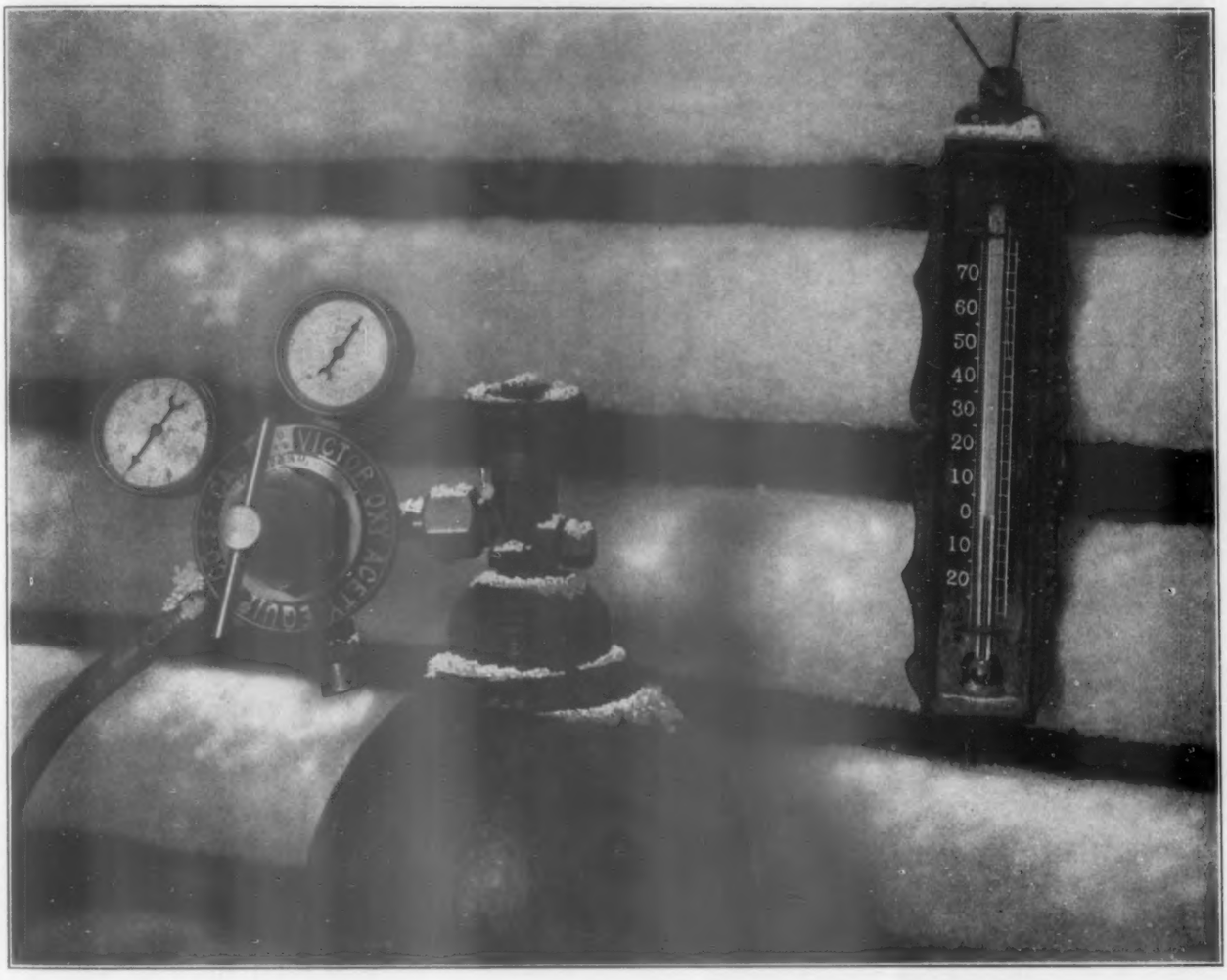

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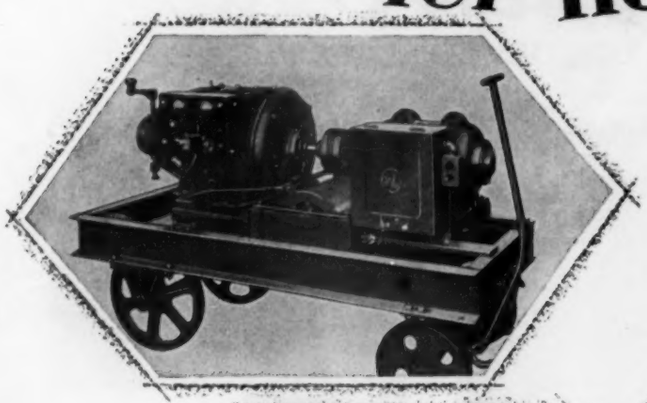

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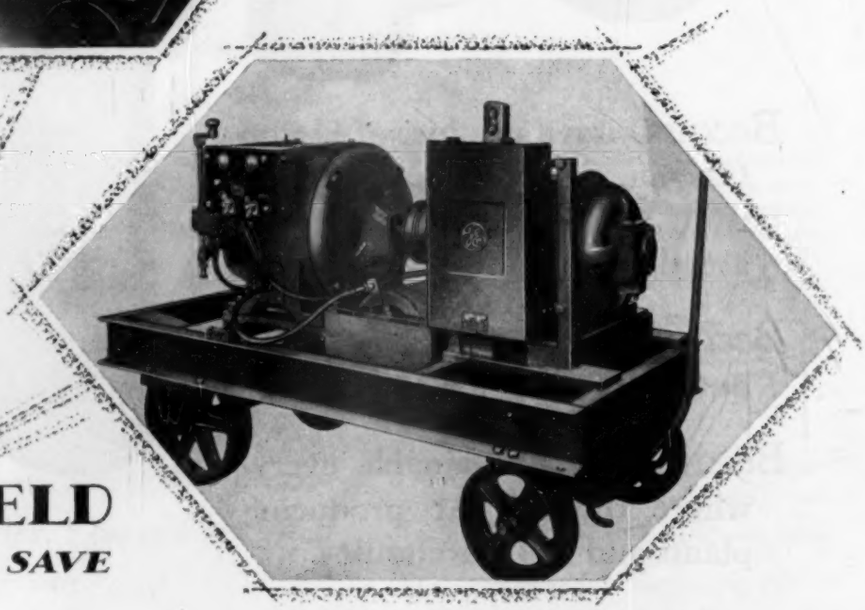

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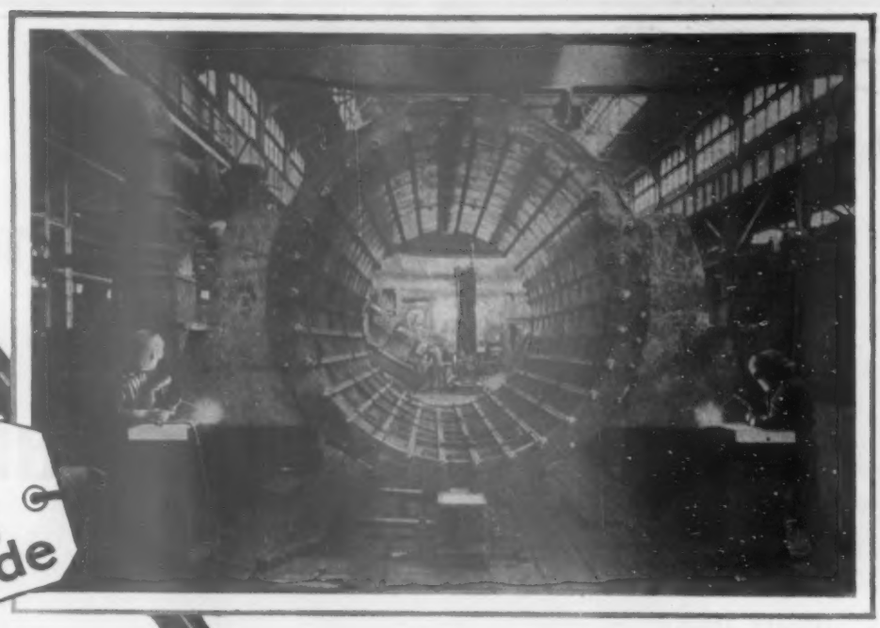

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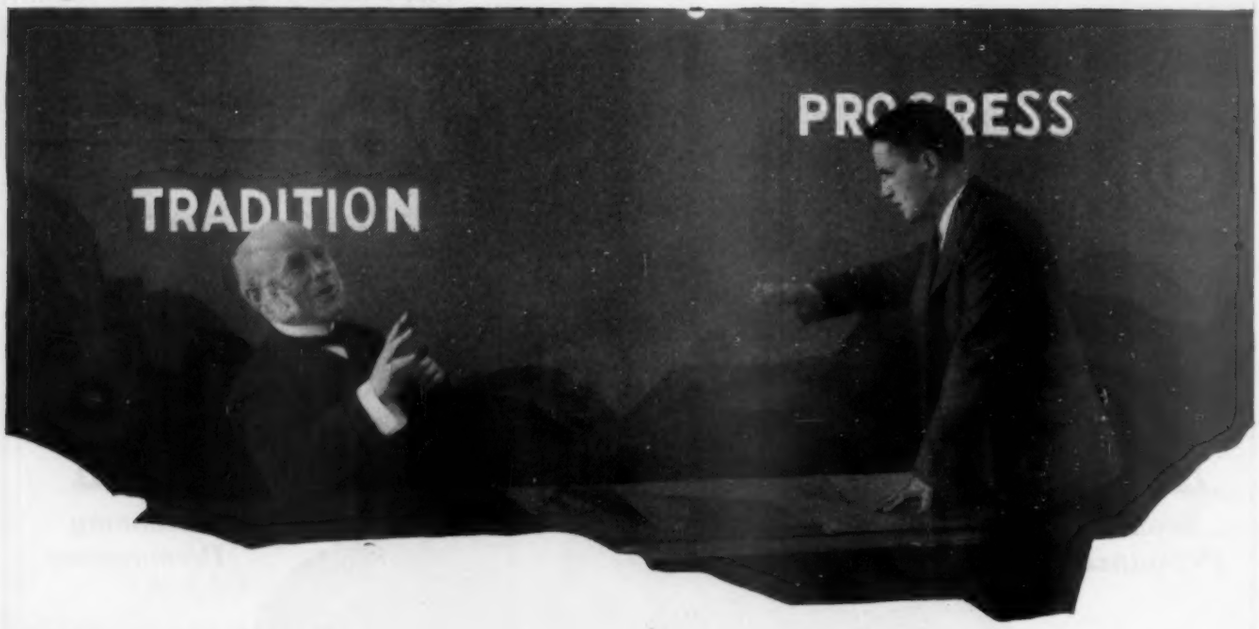

"Here, Lad . . .

I think we ought to give thanks to all the welder makers for the big advance made in arc welding during the past few years."

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W-62

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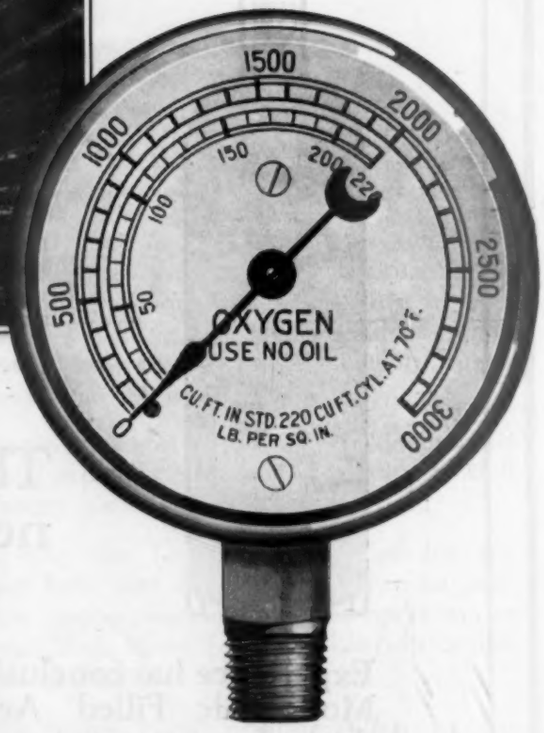

THE Law is not particularly interested in the make of gauges you use on your cutting or welding equipment. As long as these gauges are approved by the Underwriters Laboratories, they may be stamped with any maker's name.

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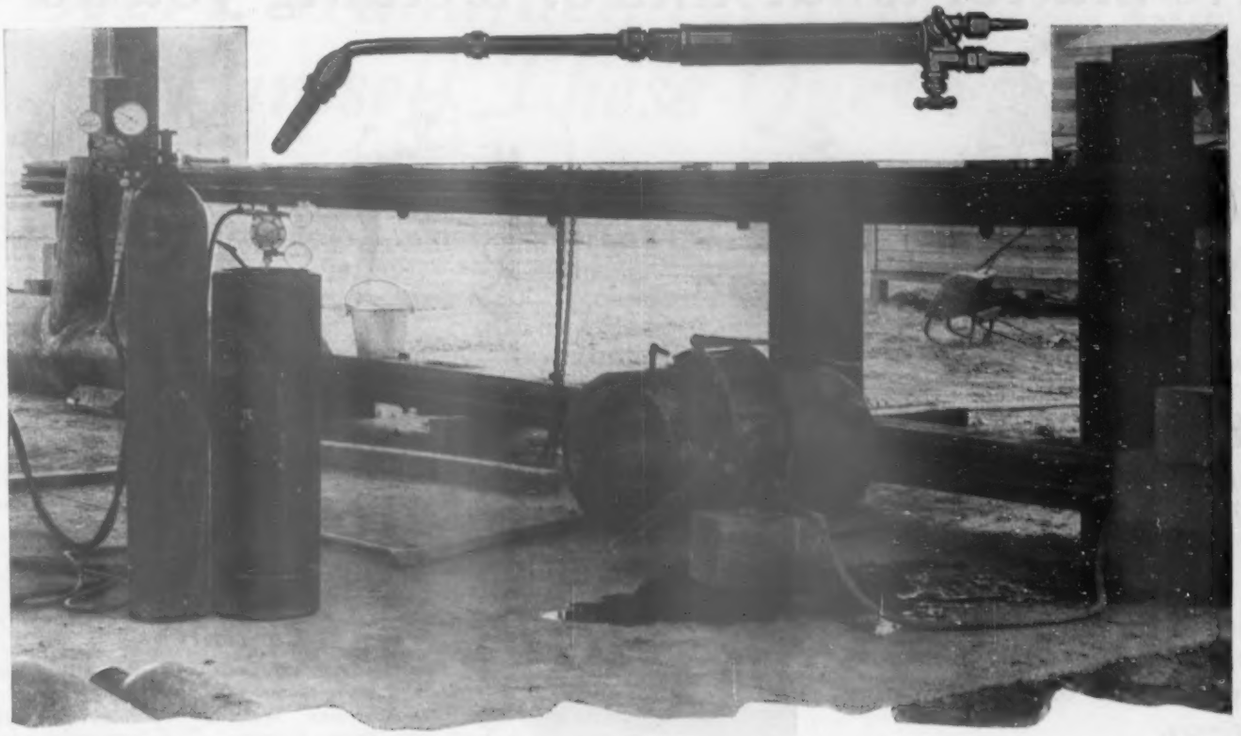

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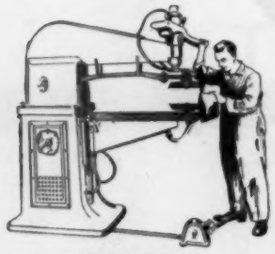

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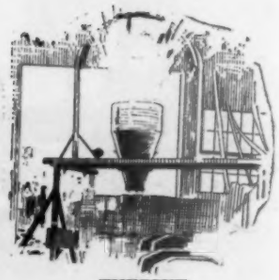

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It explains the meaning of all words and terms found in welding literature.

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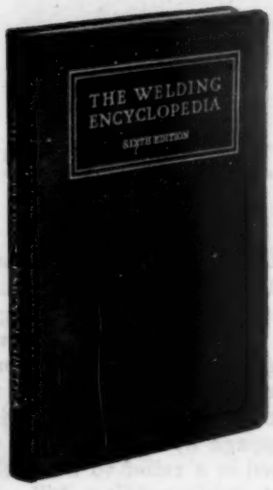

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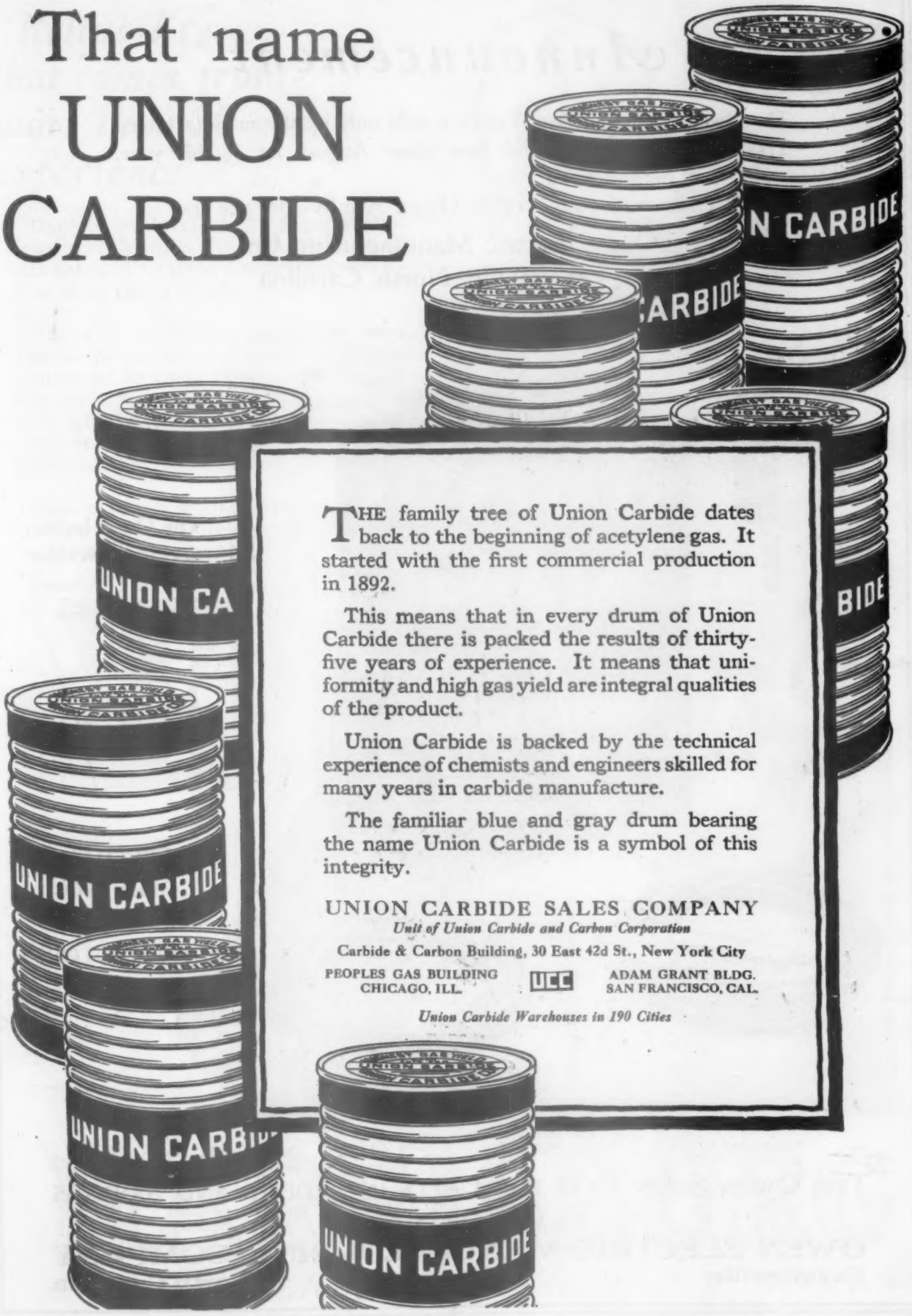

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Many of the patterns required for cutting pipe to make up welded fittings would take hours of time to develop in the drawing room.

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As a solution of the cutting problem, we have for sale a complete set of full size blue prints of curves, which enable you to cut your connections *correctly and accurately* the *first* time.

THIS SET INCLUDES THE FOLLOWING CONNECTIONS:

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2" 3 Piece Ell
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2" Rt. Angle Ell
2" Lateral
2" Round End
2" Tee
3" 3 Piece Ell
3" 45° Ell
3" Rt. Angle Ell
3" Lateral
3" Round End
3" Tee
3" Y
3" Split Bull Plug
4" 3 Piece Ell
4" 45° Ell
4" Rt. Angle Ell
4" Lateral
4" Round End
4" Tee
4" Y
4" Split Bull Plug
6" 3 Piece Ell
6" 45° Ell
6" Rt. Angle Ell
6" Lateral
6" Round End
6" Tee
6" Y
6" Split Bull Plug
8" 3 Piece Ell
8" 45° Ell
8" Rt. Angle Ell
8" Lateral
8" Round End
8" Tee
8" Y
8" Split Bull Plug
10" 3 Piece Ell
10" 45° Ell
10" Rt. Angle Ell
10" Lateral
10" Round End
10" Tee
10" Y
10" Split Bull Plug
12" 3 Piece Ell
12" 45° Ell
12" Rt. Angle Ell
12" Lateral
12" Round End
12" Tee
12" Y
12" Split Bull Plug
4x3 Tee
6x3 Tee
6x4 Tee
8x6 Lateral
8x3 Tee
8x4 Tee
12x3 Swedge Nipples
12x4 Swedge Nipples
12x6 Swedge Nipples
12x8 Swedge Nipples
12x10 Swedge Nipples
10x3 Swedge Nipples
10x4 Swedge Nipples
10x6 Swedge Nipples
10x8 Swedge Nipples
8x6 Swedge Nipples
8x4 Swedge Nipples
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5 3/16" 3 Piece Ell
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5 3/16" Lateral
5 3/16" Round End
5 3/16" Tee
6 5/8" 3 Piece Ell
6 5/8" 45° Ell
6 5/8" Lateral
6 5/8" Round End
6 5/8" Tee
8 1/4" 3 Piece Ell
8 1/4" 45° Ell
8 1/4" Lateral
8 1/4" Round End
8 1/4" Tee

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With these curves you can make patterns for any of the above on any desired material, without the use of mathematics or drawing instruments. They will save many times their cost.

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An Opportunity for Job Welders

These patterns will enable you to make up welded pipe fittings, which will be better and cheaper than cast fittings. This new and profitable line of business is a fine possibility in every locality.

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"Three Generations of Brass Making"
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Mueller
WELDING
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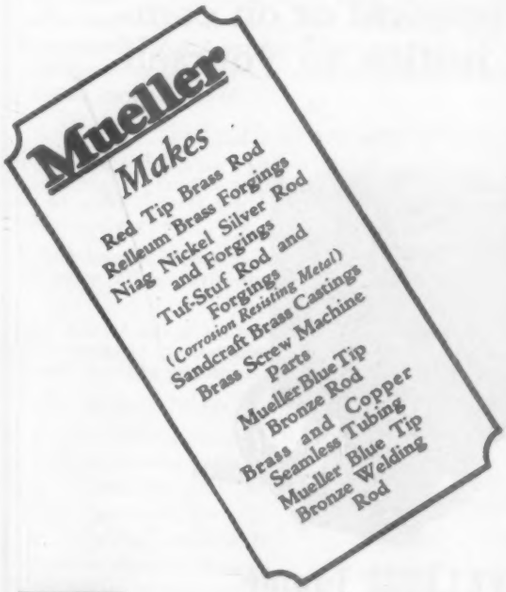

IF you have never used Mueller Welding Bronze Rod you are overlooking a product that will enable you to do better work and to do it in less time.

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Only 12 Standard Mixtures

These differ from each other mainly in the percent of silver present Solders highest in silver fuse at 1325° F., while those lowest in silver fuse at 1600°. Between these two extremes the fusing point varies with the silver ratio.

These twelve formulas are now offered in suitable forms—sheet-strip, wire, filings, etc.—for prompt shipment.

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The use of silver solders is rapidly increasing in a wide range of metal-working industries. They are solving a multitude of soldering and welding problems.

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9. High electrical conductivity	In fact all metals fusing above 1400°F.	
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(Above Illustrations are from our Bridgeport Plant)

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for greater abrasive resistance

WHEREVER a hard facing metal of great abrasive resistance is required, STOODITE offers the welder a surety of result and an ease of application otherwise unobtainable. It possesses a combination of extreme hardness and cohesiveness which resists the most severe and constant use. STOODITE is easily applied with either the electric arc or the acetylene torch. No matter what the tool or purpose, if it needs hard facing STOODITE will give better results at a surprisingly low cost. Send for our free catalog. Just drop a card to Department 1-C.

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To Use for Igniting Welding Torches

—IS THE—

ROUND FILE "IMPROVED" LIGHTER

BECAUSE it is made on correct principles, delivering a broadside of sparks across the flow of gas, making ignition certain.

BECAUSE there is nothing jerky in the motion of igniting, helping sureness of aim.

BECAUSE, by means of the spring handle it can be regulated to give more or less volume of sparks.

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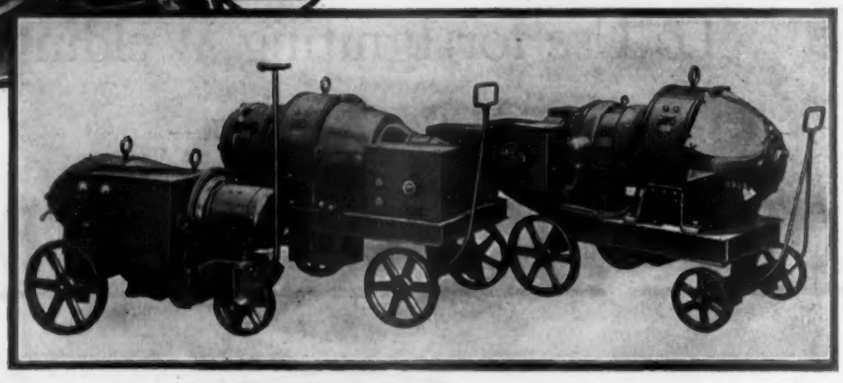
An all welded stator for a 94,200 kv-a. 1800 rpm. turbo-generator. The largest rating built to date at this speed.



Modern Arc Welding *Demands Proficient Workers*

Arc Welding Data

Separate series of bulletins available for

Executives
Engineers
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ARC WELDING, as applied today to buildings or bridges, is used in joining metals where life and property are dependent upon the quality of the weld. The increasing importance of the process has brought with it new responsibilities for the welder. He must be a skilled and conscientious worker.

The welder's best support is a good welding machine. It must require little attention, and have the stamina to meet the requirements of the toughest and most difficult jobs.

Westinghouse, in its three new single-operator welding sets, has developed just such a welder's machine. The generator is designed to automatically furnish a constant current after the desired value is set on the single dial rheostat, and the machine has a high overload capacity. Working with these machines, the operator can maintain the high standard of welding practice and thereby contribute to the growing confidence now placed in arc welding.

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KORO Processed Electrodes Have the Distinctive Appearance Shown Below

Increased production with "KORO"

(Patent applied for)

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SEVENTY-TWO feet of satisfactorily welded seam per hour on ¼" boiler plate, using from 390 to 420 amperes, is the average rate of the welder shown above. The photograph was taken in the plant of a large boiler manufacturer who fabricates his boilers exclusively by the arc welding process. KORO High Speed Automatic Arc Welding Wire is being used exclusively on the automatic equipment. Production is about five times that obtained by hand welding.

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KORO CORPORATION
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KORO Processed Electrodes Have the Distinctive Appearance Shown Below

Roebling

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Roebling electrodes are positively uniform in quality throughout the same shipment and throughout all shipments. They make the strongest, toughest welds with the least amount of trouble in welding.

John A. Roebling's Sons Company

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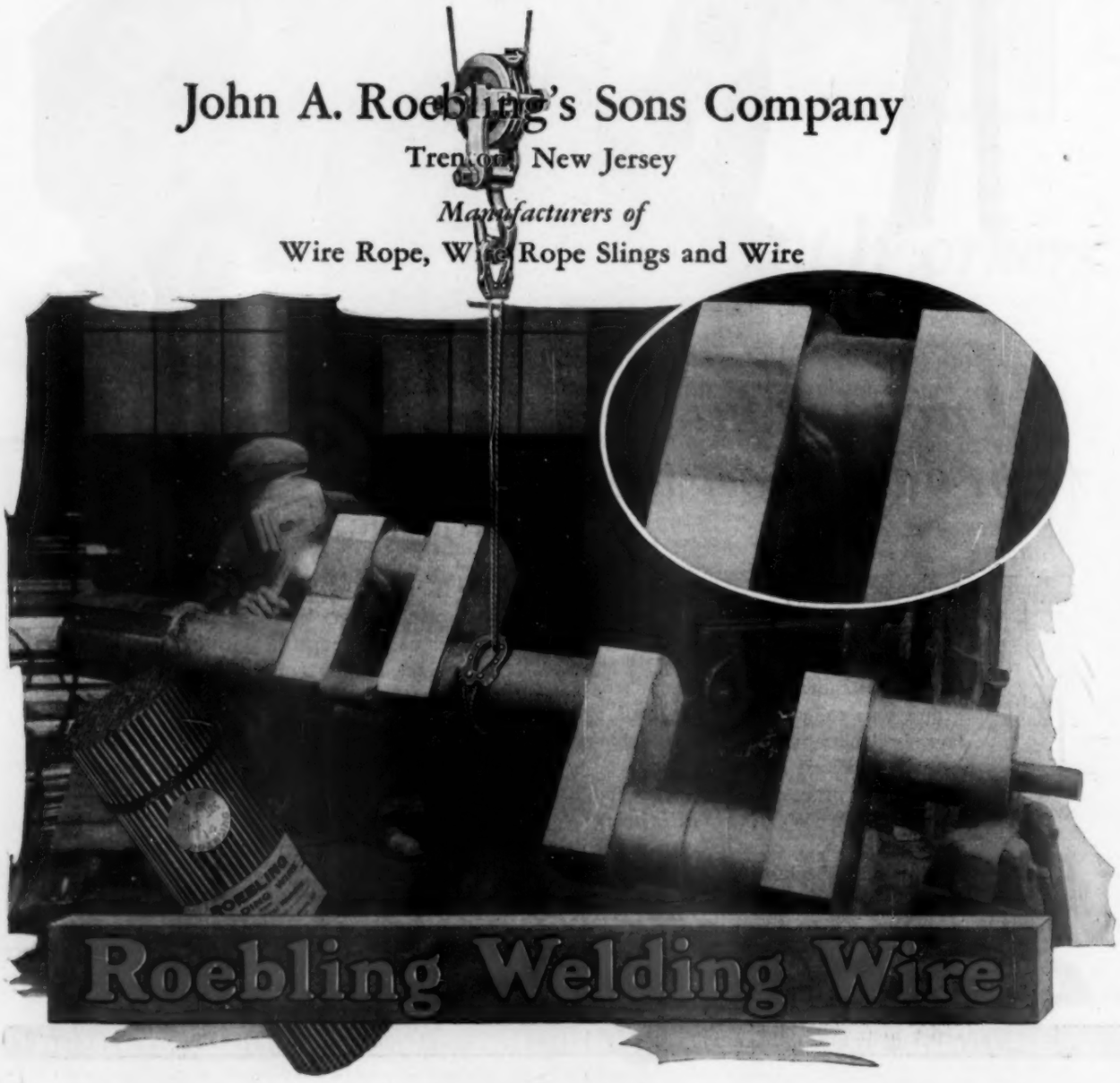
Manufacturers of

Wire Rope, Wire Rope Slings and Wire



EDITORIAL

Schools Lag Behind Welding Progress

ENGINEERING graduates from most of our universities are discovering that, however thorough their training may have been in other respects, they lack instruction in the fundamentals of one of the most important tools at their disposal. The young engineer who is unacquainted with the technique of welding, with the multitude of uses for the various processes, and with the principles of design, or redesign, for welded construction, is setting out under a handicap at the start. In his four years or more of engineering schooling, the welding processes have been mentioned only incidentally, perhaps in connection with forge work, or as a method of making repairs. Even some of those schools which have contributed to welding progress through special research in engineering experiment stations have overlooked the great importance of equipping the graduates with a thorough working knowledge of welding as a regular production process that can increase the efficiency of the plant and improve the product of his future employer. It will be well for the heads of these engineering schools to consider whether they, themselves, have kept pace with the rapid developments in welding engineering. Unless the teaching staff keep abreast of progress in this increasingly important branch of the profession, they will be depriving the student of a valuable part of the equipment with which he will face his part in the workaday world. Not only is the individual thus handicapped, but the universal acceptance of welding, which could be hastened by thousands of engineering graduates well grounded in the theory and practice of the processes, is retarded instead. Let welding assume in college curricula the position it has won in engineering practice, and let the student be taught to think in terms of welding in all problems of design, fabrication and maintenance, and then we shall be able to supply the demand for capable engineers in this new, interesting and profitable profession. There is ample room for progressive development in all applications of welding by those who are trained to meet the problems that must be met, and there is ample room at the top for the engineer who makes welding his special field. But there is just as great need for a thorough understanding of welding by every engineer in the metal using industries, regardless of the product or of his own function in the design or production of the product.

A Real Panacea

OCCASIONAL outbursts of dissatisfaction might lead one to believe that something is radically wrong with the wire business, the apparatus business, the gas business, or the supply business, and this isn't a healthy attitude for either the seller or the buyer. Whatever is wrong is something which runs through every industry in the country, a general lack of salesmanship. A manufacturer will learn a good lesson by checking up on this statement. Let him answer a dozen advertisements concerning a commodity of which he knows very little. Then let him study the methods of twelve firms following up his inquiry. Then let him compare his own sales methods with these. He will learn that there are many grades of salesmanship, with as many different possibilities of building a healthy business, and will see conditions in his own industry in a new light. The inspiration of a real constructive merchandising program tends to diminish the importance of competition.

The Zinc Fetish

IT IS still believed by many that the welding of pipe in buildings must wait for some new magic method of welding galvanized pipe, because the lack of visible coating denotes a susceptibility to rust. One competent investigator, however, recently pointed out that a bronze welded joint in galvanized iron acquires a coating which has thoroughly satisfactory rust-resisting properties, and his statement is supported by a considerable experience of manufacturers of galvanized iron articles. The zinc coating is not a serious obstacle to the progress of pipe welding. A little experimental work will develop definite methods of handling it.

When Is a Secret Process

OUR good friend, Robert Kinkead, has hit upon an original way of passing his thoughts along to his friends which they can hardly fail to enjoy. The monthly letter full of wholesome philosophy is certainly a pleasant part of our reading program. His recent comments on "secret processes" are strongy supported by the experience of many men who go from shop to shop as a matter of routine. The carefully guarded process is seldom a secret, and often not fully developed. An open door attitude on the part of plant owners is more apt to do good by inviting suggestions for improvements than to do harm by the revelation of methods which are not beyond the average human ingenuity.

The Last Hurdle

A FEW years ago the chief obstacle to the introduction of welding into the field of steel bridge and building construction was the fact that a technique had not been developed comparable with that of the processes which it was intended to supplant. Even the most optimistic enthusiasts for structural welding did not advocate employing the process on large structures until the design of joints could be more nearly perfected and the design of the building and bridges themselves could be better adapted to erection by welding. Some of the best engineering minds in both the welding and the structural fabricating industries were applied to the problems involved, with the result that buildings of considerable size and for a variety of purposes have been completely welded, as well as bridges and other structures of types that had formerly been riveted. The adaptability of welding has also been demonstrated by the ease with which new members can be added to existing structures, such as reinforcements to railroad bridges, wind-bracing to buildings, or additions such as that recently made to a telephone exchange building without the interruption of service which would have resulted had riveting been used. Now that structural welding has emerged from the experimental stage, it still remains for the majority of architects, engineers, steel fabricators, building owners and civil authorities to develop that confidence in welding which will gain acceptance for the process in quarters that so far have entirely overlooked this phase of progress. A case in point is that mentioned above, of the telephone exchange addition tied in with the old structure by welding, while in another city a few months later an identical job was riveted because the local authorities were not sufficiently familiar with what welding has already accomplished. There are numerous factors of opposing interests, lack of information, and undue conservatism which must, and will, be overcome. The fact that welding is both a cheaper and a better process than riveting cannot long be hid or disguised.

Steam Fitters
Pipe Welders
Repair Shops

Here is a cutting attachment that

—Changes a torch from welding to cutting in 30 seconds.

—Adds NO joints.

—Cuts to 3 inch Steel with your welding regulators.

—Can be attached with pressure on the hose.

You do a lot of welding with your Rego GM torch. Often you want to cut when it would be hard to change torches. Maybe you're at the top of a ladder some distance from the tanks, and want to change to a cutting tool. When you have a GMK cutting attachment you simply remove the extension from your GM torch at the mixer nut, put on the attachment, and do your cutting without going near the tanks to shut them off.

The objection to a cutting attachment has been the number of joints it adds to the torch—and each joint is a possible trouble maker. The GMK attachment adds NO joints. It has just two—one at the tip and one at the mixer—the same number as the welding torch.

It is made of brass forgings and special non-bending tubing. A simple positive spring valve controls the high pressure oxygen.

Guaranteed to Cut Up to 3″ Steel

The Rego GMK attachment will cut up to 3″ steel in the hands of anyone and up to 6″ when used by an experienced operator. For 6″ cutting a commercial size oxygen cutting regulator (Rego 1601) is needed, but Rego small (2″) regulators will supply sufficient oxygen for 3″ cutting. Cutting tips are made of one piece pure drawn copper.

Write for REGO
Catalog No. 51

THE BASTIAN-BLESSING CO.
244 E. Ontario St. Chicago, Ill.

REGO
GMK Cutting Attachment
for REGO Model G.M. Welding Torch
$20.00 with 1 Tip

Aluminum Welding an Aid to Aviation

The Ideal of Lightness and Strength of Material and Soundness of Joint Is Achieved in Welded Aluminum Construction

By Daniel M. Gershon*

WITHIN a comparatively short time practically all airplane parts will be welded construction, in the opinion of experts in aircraft manufacture, because it has been proven conclusively that welding is the most certain and strongest method of joining airplane parts together. Welding is today being employed by aircraft manufacturers throughout the country as the most feasible means of joining two or more edges of aluminum, either sheet or rod, together. Not only are welded aluminum tanks

Fig. 1—Vought "Corsair," Showing Position of Tanks.

employed very widely at present, but engine cowling of aluminum, with joints and fittings welded, is coming to the fore.

In present-day aircraft production, an outstanding objective is to keep the craft down to minimum weight, to increase the pay-

Fig. 2—Welding Over Baffle Plate Rivets, to Insure Trouble-Proof Tank.

load, and to make every inch of space possible, available for the carrying of additional weight. Welded aluminum tanks are a very important factor in reducing the weight of the aircraft, for the reason that they are much lighter than either of the two metals formerly commonly used, terne plate and brass. It is possible to carry between two and a half and three gallons of gas per pound of tank, a much larger percentage than secured with the use of any other metal.

An important factor in the new fueling system of the aircraft which will make the proposed New York to Rome flight, are the special tanks built of aluminum, with all joints and fittings welded by the oxy-acetylene process. This type of tank is favored by prominent flyers. Commander Byrd, when he leaves for his South Pole flight this summer, will number among his planes a Bellanca, fitted with a huge welded aluminum gas tank carrying 500 gallons of gas, and a special oil tank. Bert Acosta's "Splitdorf," in which he expects to make a new endurance test flight, has a large welded aluminum tank, together with an auxiliary tank.

Welded aluminum engine cowling also is becoming popular, and the Paramount Welded Aluminum Products Corporation is at

Fig. 3—Inside Construction of Welded Aluminum Gasoline Tank Showing Baffle Plates, and Completed Tank.

present building cowling of aluminum, with joints and fittings welded. This effects a great saving in weight, engine cowling being a very large and important part of the plane. The use of aluminum pilot seats emphasizes the extent of the efforts to cut down aircraft weight to a minimum.

In the construction of these parts, the oxy-acetylene welding process is employed. Before the weld is made, the tanks, cowling, and seats are tacked at certain parts. The welding flame is necessarily carefully regulated, due to the low melting point of aluminum, and then the tanks, cowling, and seats are welded all round on the seam. The fittings are welded on, and the rivets on the baffle-plates are welded over. This is followed by a careful test of all welds to make certain that there are no defects. The soundness of the weld is affected by the kind of welding flux used, and it appears that even more harm can be done to a tank through use of inferior flux than by use of an inexpert welder.

Publicity Manager, Paramount Welded Aluminum Products Corporation.

Before the introduction of aluminum in aircraft construction the metals most widely used in fuel and oil tank construction were terne plate and brass. Aluminum was naturally considered excellent for aircraft fuel and oil systems, but difficulty arose in its use because of the trouble of joining the seams together so that they would be absolutely leak-proof. An alloy of aluminum was first tried for soldering the seams of the tanks. This proved inefficient, a perfect, trouble-proof tank not being assured. Different types and various mixtures of solders also proved failures. When the first attempt was made to weld the tanks, it seemed that due to apparently excessive heat of the oxy-acetylene flame, the use of welding would be unsuccessful. However, careful regulation of the flame and practice in welding obviated this difficulty, and the Paramount Corporation became the pioneer in the welding of aluminum airplane tanks.

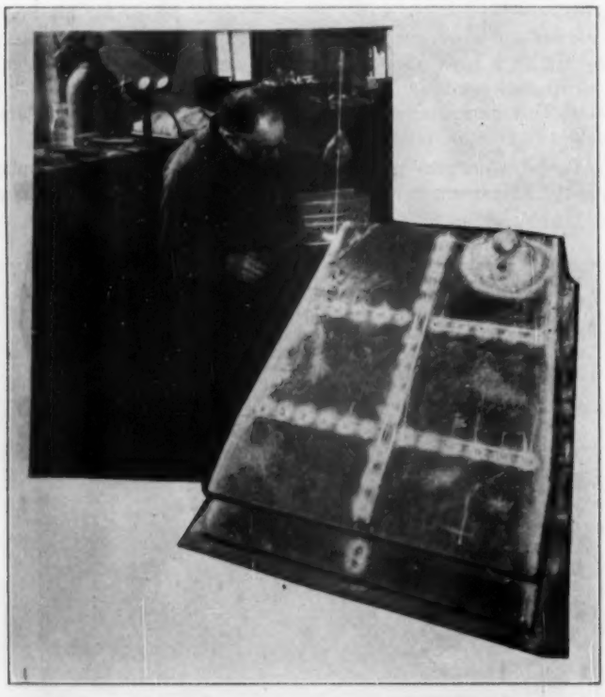


Fig. 4—Welding Seams of Large Gas Tank. Note Welded Sump.

To insure the strongest type of plane construction the main framework of the fuselage should be of highgrade or alloy steel tubing, with joints and braces welded. This type of construction has proved its superior strength when put to the most severe tests. For example, when a plane of this type construction, having stalled at a height of over 75 feet, crashed to earth on its nose and wing-tip, the two gasoline tanks directly behind the pilot's seat, which were of aluminum with all joints and fittings welded, did not spring a leak. The baffle plates had been riveted to the sides of the tank and then welded so as to insure strength and perfection. Had the gasoline tanks been of harder metal, or had they not been welded they would undoubtedly have burst with the result that the fuel would have deluged the hot engine and pilot, with probable fatality. As it was, the welded tank not only failed to leak but was undamaged and the pilot was spared injury from this source.

Of the several types of airplane tanks, wing tanks, which are of comparatively recent use, enable the plane to carry additional gas, as they fit into the wings of the plane and make available, hitherto unused space. The fuselage tanks vary as to position in different types of planes, some being narrow tanks fitting on the sides of the fuselage, one on either side of the pilot. As is shown in the U. S. Navy plane pictured here, the Vought "Corsair," the tank, which was built by the Paramount Corporation, is quite long and is beaded from top to bottom in three places. The baffle plates are welded from the outside over the rivets on the tank. This prevents leaks in the tanks, which are all given the standard Army and Navy tests for leakage. As can be seen from the illustrations, all the seams on the tank are welded, making the tank absolutely trouble-proof.

The Paramount Welded Aluminum Products Corporation has been building airplane tanks of practically every description, manufacturing the tanks in accordance with drawing or blue-print submitted. Frequently the construction of the tank is left solely

Fig. 5—Fuselage Tank, Such as Used on Vought "Corsair."

to the president of the company, Mr. Billig, under whose expert supervision is performed all layout work of the tanks, all shaping, brushing, testing and welding.

The welding procedure at this plant has been developed to the highest degree, welders having discovered many new points, and applied them to their work. The average welding operator will not take chances on welding duraluminum. However, at this plant dural. is welded as readily as aluminum. Another metal with which few seem to have any marked success in welding, is magnesium, a metal which very easily catches flame. With especial care, and under watchful eyes, the Paramount welders also weld this metal.

Mr. Billig, a prominent authority on aircraft construction, expresses his belief that within a comparatively short time all the parts of an airplane will be of welded construction for the reason

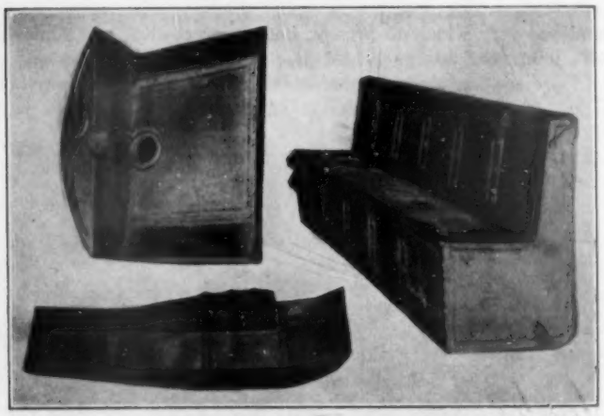


Fig. 6—Left: Wing Tank of Unusual Shape. Right: Combination Oil Tank and Pilot Seat.

that, as has been proven time and again, welding is the strongest and most dependable method of joining metals together, the weld holding firm at all times, in the gravest emergencies and under the most severe tests.

CUTTING TORCH PLAYS ROLE OF LIFE SAVER

The cutting torch is often called upon to meet an emergency, sometimes where human life is in danger. An example is reported by the St. Paul Welding & Mfg. Co., who recently received a telephone call to rush an operator with a cutting torch to cut away some steel beams under which a man was pinned. On arriving at the scene, the operator found that a crane had toppled over into the river, and under the

crane was a man, totally submerged except for his head, and calmly puffing a cigarette. A few inches away was a barge which threatened any moment to drift up against the man and crush him. It was a ticklish job, for the operator, too, had to crawl down between the barge and the beams, but the old reliable cutting torch did its work and within a few minutes both the operator and the pinned workman crawled out to safety.

WELDING IN THE SIERRA NEVADAS

In California, the conservation of water and the development of water power projects has been carried out very extensively so that this state stands in the front rank in hydro-electric power.

The water power available in California as primary power is variously given as from 7 to 10 million horsepower. The amount already developed is somewhat over one million horsepower.

Yet, as a rapidly growing commonwealth, there is always a demand for more and more water, which means more dams and pipelines.

The ranges of the Sierra Nevada Mountains, which rise to lofty heights on the eastern border of the state, extend the length of the state and furnish enormous watersheds, the runoff from which is caught in dams for power and irrigation purposes. Practically no rain falls during the summer months.

Fig. 1—Portable Camp on Bench. After the Camp Was Moved the Pipe Was Installed in This Section.

The hydro-electric power houses usually start at an altitude of from 5000 to 6000 feet elevation and the water is run through a series of power houses by means of pipe lines, tunnels and penstocks until the lowlands are reached when it is either returned to the stream bed or used for irrigation.

Fig. 2—Welding Crew. Note Construction Horses.

The new 50,000 K. W. plant of the Feather River Power Co. lies on the south fork of the Feather River in Plumas County The Western Pacific Railroad threads its way through this scenic canyon on its way east. The old placer diggings of '49 can be seen roundabout.

The storage reservoir for this plant was formed by building a large rock fill dam across Buck's Creek and flooding Buck's Meadows of many square miles area, the heavy stand of timber having been cut off. The elevation of this reservoir is 5,300 feet.

From the reservoir, the water flows through three miles of tunnel and enters two penstocks for a drop of 2,650 feet, the highest head on the North American continent. It then returns to the Feather River.

In order to increase the watershed of the reservoir, a diversion pipe line was ordered to gather water from streams for 9 miles around the mountain sides on another watershed and bring this water back to storage.

The large expense incurred in installing this pipe line was justified by the amount of power developed by the water recovered.

This all welded diversion line is 36" diameter, ¼" plate and was fabricated in 14 foot lengths.

The bench and ditch was dug by R. C. Storrie and Co. of San Francisco, and they were the general contractors on the project. Its tortuous way was blasted out of the steep granite mountain side, the slope of which ranged from 30 to 70 degrees.

The contract for the pipe and installation of same was taken by the Western Pipe and Steel Co. of San Francisco, and the pipe was fabricated at their South San Francisco plant.

Fig. 3—Pipe Distributed Over Ditch, There Being No Other Place to Put It.

All longitudinal seams were automatically welded with General Electric arc welding machines. The lengths were then hot dipped and wrapped with soil proof covering and shipped to the nearest point by rail. From here it was hauled by trucks 55 miles over mountain roads to the point of installation.

Brown Bros. Welding Co. took a contract from the Western Pipe and Steel Co. to weld and install the line after the pipe was delivered alongside the ditch. This meant running a complete portable camp for fifty men 300 miles from home and 30 miles from the nearest town.

Every detail was worked out down to ordering toothpicks for camp. Every piece of equipment was tested out beforehand because we have found from previous experience that serious

delays on such jobs can be caused sometimes by very small things.

Special all welded collapsible horses were made to construct the line upon and still heavier lowering horses of 10 tons capacity were placed at 100 foot intervals for lowering the line into the ditch. These lengths to be lowered ranged from 1500 to 2000 feet between tieins.

The lowering operation was accomplished by special ball bearing screws with cable slings around the pipe. 100 tons of pipe was lowered in this way in as short a time as thirty minutes.

As all the pipe had to be handled by hand, it was necessary to design equipment that was light. As it was finally worked out, the heaviest piece of equipment to be handled weighed 92 pounds.

Owing to the fact that 15 degrees was the maximum allowance for an angle on any one joint, it was often necessary to cut the pipe into 7 foot chords to make the hairpin bends at the heads of gullies.

The joints were miter cut after the pipe was placed over the

Fig. 4—Pipe Ready for Lowering.

ditch and the angle determined by means of a protractor, so it was a case of tailoring the pipe to suit the contour of the ditch.

Each end of pipe was thus miter cut and at the same time bevel cut for welding. This was accomplished by special equipment developed by Brown Bros. Welding Co. for such lines. There was no straight pipe in the line.

100 pound Airco generators were placed along the line at 1000 foot intervals with service pipe lines between. Prestolite cylinders were used for tieins and welding on relief valves and blowoff connections.

The line was specified to have all the field joints gas welded with butt joints and as there were no tunnels or syphons it was not necessary to take electric equipment on the job.

Heads were welded into sections of about 5000 feet each and the pipe filled from mountain streams and tested at 100 pounds pressure and allowed to stand for several days with the pressure on. There were no expansion joints in the line. The pipe ditch was dug next to the bank so that when covered, the pipe would be protected from storm, water and slides.

The welding equipment other than generators was furnished by the National Welding Equipment Co, as subsidiary of Brown Bros. Welding Co.

Five miles of the line was installed during the short summer season of four and a half months at this altitude and we were driven out November 1st by winter storms and will finish the job during the summer of this year.

It is our belief that the time is not far distant when practically all water lines will be completely welded as the welded installation has many advantages over the riveted.

We have a two reel film of this installation work which is available by arranging with us in advance as there is quite a demand for it.

PORTABLE WELDING OUTFITS PART OF EVERY BATTLESHIP'S EQUIPMENT

Welding has now become one of the most important jobs done aboard ship by the Navy. Seldom does a battleship call upon a navy yard for welding work. When the ship is in the yard having new construction placed on her, welding is occasionally done by navy yard workmen, but all other welding is performed by the ship's company.

In a recent issue of the *Iron Age*, G. K. Spencer describes some of the emergencies in which welding is called upon to put a ship back into commission with the least possible delay.

During fleet maneuvers in the Pacific two destroyers collided while emerging from a smoke screen. Boat davits and the end of a torpedo tube were clipped off. The ship was brought alongside the tender to the destroyer squadron for emergency repairs. Within a few hours portable welders had completely repaired both the davit and the torpedo tube.

This is only one of thousands of jobs performed every month aboard the ships of the fleet. The destroyers, being pressed for combat space, carry no portable welders, but every other ship in the fleet does. The larger vessels, such as battleships and train vessels, carry both electric and gas welding equipment.

So significant is this work considered that special instruction in electric and gas welding is given the mechancal personnel at regular periods on all of the major vessels of the train, numbering some 30 in all. Special articles on the subject are also published in the principal journals read by the enlisted personnel.

Another example of the class of work handled on shipboard is the welding of shanks to anchors, involving bringing together pieces of metal 10 in. square and larger. The first inspection made on the bottoms of destroyers coming into dock is that for the decision regarding any necessary welding. It often happens, however, that major repairs must be made without taking time to go to the nearest yard. An instance occurred several months ago when it became necessary to repair the blades of a propeller. It would have cost some $50,000 for the Navy to tow the ship from the West Indies to the nearest dock at Panama and another $20,000 to dock and repair her at the yard there. Instead, with a portable cofferdam, thrown around the injured propeller and the water pumped out, the ship's own mechanical personnel went down into the cofferdam, removed the propeller and brought it to the main dock. Here, with a portable welder from the tender, the complete repair was made.

It is still less than 18 months that this widespread use of portable equipment has been in practice, but the saving alone in that time has been in excess of $300,000. The cost of all the equipment used was under $60,000. This would represent a great saving in any industry. The mercantile marine, observing the success of the naval shipboard welding work, has begun to carry portable welding outfits, and much good work is reported as a result.

WELDED STEAM LINE FOR CLEVELAND'S SKYSCRAPER TERMINAL

The new Union Terminal Building at Cleveland, Ohio, one of the largest and most modern passenger terminals in the world, is to be heated by steam generated at the plant of the Cleveland Electric Illuminating Company. The problem of a high pressure line to get the steam from the generating station to the Terminal Building was quite a serious one. It was finally decided to carry the steam through an all welded pipe line, located in a tunnel forty-five feet under street level, and the job was successfully completed by A. R. Brueggeman Company, Keith Building, Cleveland.

The total length of the line was 1800′. 16″ outside diameter pipe, having a wall thickness of ½″ was used, and the number of lineal feet of seam welded was 352′. The pipe came in 20′ sections and each joint was beveled and welded. The welding was done by the oxy-acetylene process and "Weldite" 3½% Nickel Welding Rods were used.

The line was designed for a working pressure of 125 lbs. per square inch, but to insure its absolute safety, it was tested at frequent intervals at a pressure of 525 lbs. per square inch. The testing was done by welding a plug into the end of the partially completed line, and water was then pumped into the pipe until the required pressure of 525 lbs. was reached. After testing, the plug was cut out and an expansion joint welded in its place. Under this very heavy pressure, only two pinhole leaks were developed in the welds, and even these pin holes

Welding Plug in Section of Line for Hydraulic Test.

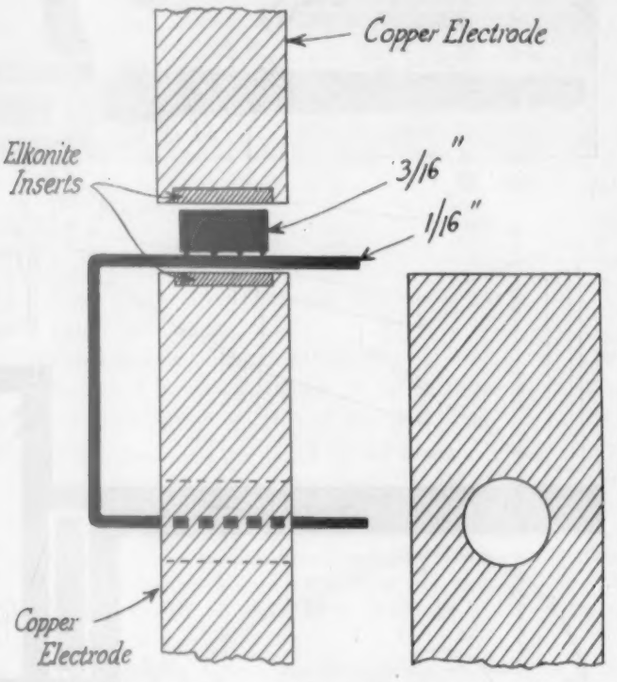
did not appear until a pressure of 425 lbs. had been reached. The picture shows the plug being welded in place, prior to one of the hydrostatic tests.

A tensile strength test of a fully welded joint showed 45,664 pounds per square inch, but this was inconclusive, as the test specimen broke in the pipe outside of the weld, indicating that the strength of the weld was considerably greater.

"Weldite" Nickel Steel Rods, manufactured by Chicago Steel & Wire Company, were used because an ordinary mild steel welding rod would not have given the necessary tensile strength to stand the hydrostatic pressure test.

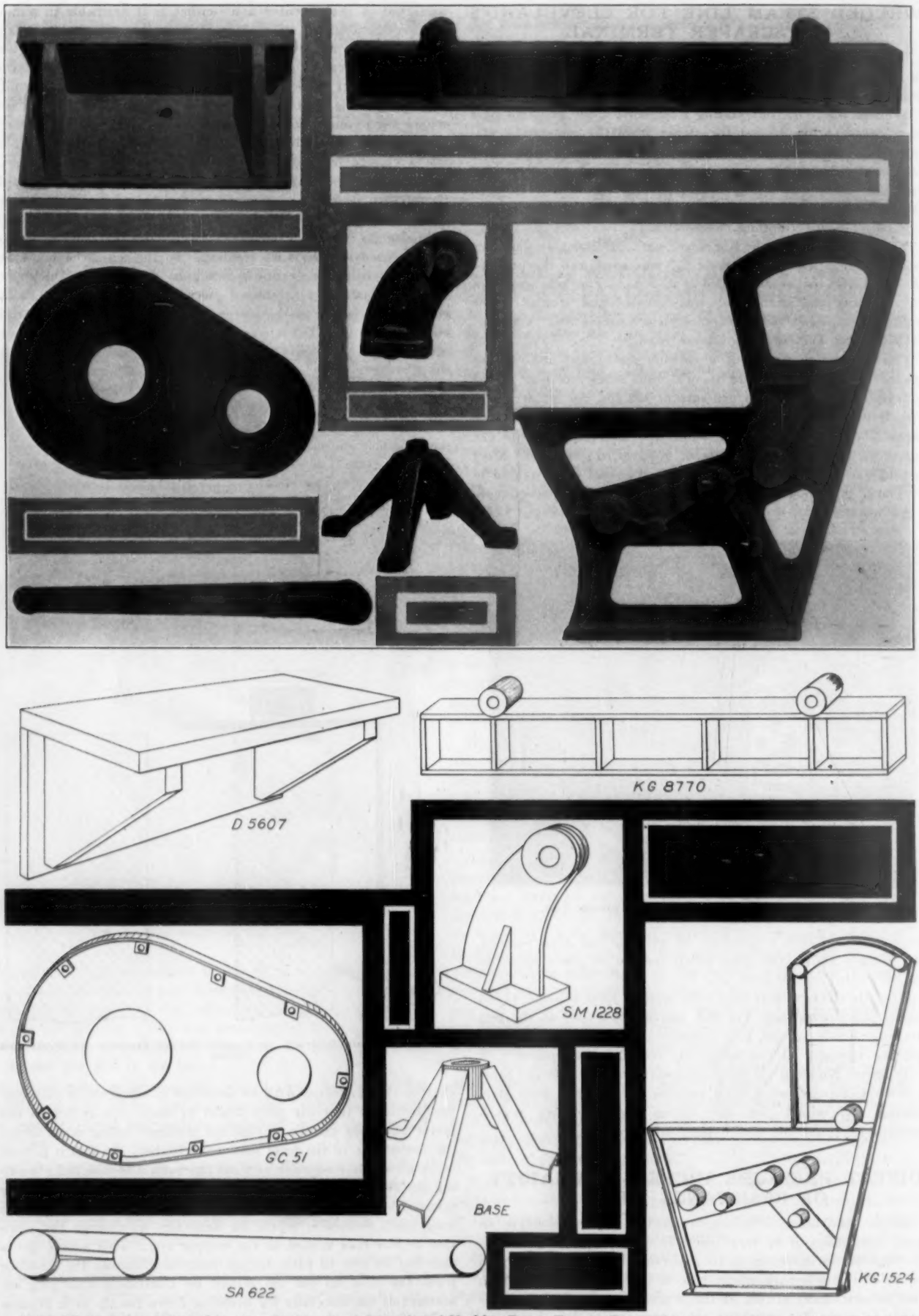
DIRECT PRESSURE INCREASES QUALITY OF RESISTANCE WELD

Where Resistance Welding is used in the production of metal assemblies it is very often essential that the machinery used be so designed as to positively insure uniformity in the weld. This is particularly true in the case of welds which must be practically strong as the original metal. It is not desirable to leave too much of the operation to the discretion and skill of the operator and neither is it desirable to add to the production cost by making it necessary to give each and every weld a rigid inspection or test. It is far better and more economical to go to some trouble and expense if necessary to protect the equipment to the point where uniformity in the weld is practically assured. There are many cases where such construction is highly desiable and yet the owners of machines have not bothered to find out whether there is not a chance for improvement. A problem which will serve to illustrate the possibilities of improving work by simple changes in design was recently submitted to the engineering department of Elkon, Inc., Weehawken, N. J., whose product, Elkonite, is widely used for making tips for electrodes or clamps used in resistance welding. In this case the manufacturer was using projection welding to join a small thick butt on to one side of a U shaped piece of thinner stock. On account of the shape of the pieces the ordinary straight electrode could not be used but it was necessary to have one which was offset so as to accommodate the opening between the sides of the U. It is obvious that by following such procedure there was considerable difficulty in getting a uniform pressure at the weld. While working on the construction of suitable Elkonite tips for an electrode for this work, the engineers of the Elkon organization recommended that the offset electrode be replaced by the straight copper rod type of electrode with a hole drilled through it at just the right place to accommodate the unwelded arm of the U, as shown in the accompanying



Special Electrode Designed to Furnish Better Pressure for Projection Weld.

sketch. Experiments with an electrode constructed in this way demonstrated that the work could be done just as fast if not faster and that on account of the pressure being more direct the uniformity of the weld was much higher. In fact it proved to be a complete solution of what has been a troublesome welding problem. On account of the longer life of the electrode secured by using the Elkonite insert in the tip, it would be a long while before it would be necessary to change the position of the hole drilled in the copper rod. This would probably not be true of plain copper electrode because the distance from the hole to the tip would be constantly changing on account of the necessity for dressing down the tip as it became mushroomed in service.



Above, Photographs of Typical Castings Used in the Construction of Machine Bases, Frames, Etc., and Below, Drawings of Their Welded Steel Counterparts, Fabricated Entirely of Standard Rolled Steel Shapes.

Welded Steel Equivalent of Castings*

Cost Reductions Made Possible by Use of Welded Steel in Machinery Construction and Designs of Parts Suitable for this Method

By R. W. Capper†

THIS entry contemplates showing the approximate cost reductions possible by the use of welded steel construction in place of certain specific castings. The parts chosen for the analysis are typical of the kind of parts which can be profitably made in welded steel construction. It is estimated that at least 15 per cent of the annual output of gray iron castings made in this country fall within the class analyzed. The principles herein illustrated therefore apply to approximately 900,000 ton of castings used annually. The price of such castings averages $105.00 per ton. The welded steel equivalent of the castings averages 58 per cent less or a saving of $60.90 per ton. On 900,000 tons of castings converted into welded steel, the saving would amount to $54,810,000 per year.

The line drawings showing the assembly of pieces of hot rolled steel into the equivalent of the castings were made with the idea of showing how closely the welded steel parts may be made to the equivalent casting in general shape and appearance. The cost figures are given on the type of construction shown. In actual practice, the design would be modified in several cases to reduce the cost of the welded steel construction below the figures shown.

Advantage was taken of the superior physical properties of hot rolled steel as compared with cast iron, both in the matter of rigidity and strength. Never more than half as much steel as cast iron was required owing to the fact that steel is approximately two and a half times as rigid as cast iron for the same section.

The costs are based on the manufacture of five pieces of a kind at one time. Manufacture of a smaller number of pieces at a time would increase the cost and conversely, if made in larger numbers, the cost would be decreased.

Manufacture of the specific pieces illustrated can be accomplished in any well equipped steel fabricating shop which is operated in connection with a machine shop. No special machinery is required. Cutting off machines, rolls, bending press, angle benders, etc., permit of the construction of a wide variety of shapes which may be welded together into the equivalent of a casting.

In the possible savings estimated, no account is taken of any of the advantages of welded steel construction as compared with castings. The fact that patterns are eliminated in welded steel construction, eliminates that element of cost. The lower cost of welded steel pieces reduces inventory and thereby reduces overhead expense, yet no definite figures may be used unless the number of parts used and kept on hand is known.

The claims are based solely on the production of the equivalent of a casting at less cost.

Pattern Number	Weight Lbs.	Rough Casting Cost	Welded Steel Weight	Labor Cut & Shape	Labor & Power Weld		Total Weld Steel Cost Material Labor and Overhead	
						M.	$2.60	
D-5607	271	$10.84	130 lbs.	$0.65	$1.35	L.	2.00	
						O.	3.00	T. $ 7.60
						M.	.64	
SM-1228	76	3.80	32 lbs.	.75	.50	L.	1.25	
						O.	1.88	T. $ 3.77
						M.	.40	
SA-622	43	2.58	20 lbs.	.60	.20	L.	.80	
						O.	1.20	T. $ 2.40
						M.	.50	
Base	49	2.45	25 lbs.	.40	.30	L.	.70	
						O.	1.05	T. $ 2.25
						M.	.45	
GC-51	35	2.10	15 lbs.	.30	.30	L.	.60	
						O.	.90	T. $ 1.95
						M.	2.40	
KG-1524	254	17.78	120 lbs.	1.75	2.00	L.	3.75	
						O.	5.63	T. $11.78
						M.	4.00	
KG-8770	459	22.95	200 lbs.	1.00	2.00	L.	3.00	
						O.	4.50	T. $11.50
								$41.25

Total Casting Weight 1187 *lbs.*
Total Welded Steel weight 542 *lbs.*
Total Casting cost $62.50.
Total Welded Steel cost $41.25.
Steel at 2c *per lb. except No.* 10 $P1^3$ @ 3c *per lb.*
Overhead figured at 150% *of direct labor.*

The above costs are based on the manufacture in multiples of five pieces at a time, but without the use of jigs or fixtures. These costs could be reduced by the use of jigs or fixtures.

In these figures no pattern charges are included in the casting cost. Since both castings and its welded steel equivalent are calculated on a basis of making five of each, one-fifth of the pattern cost for each piece should be added to the casting cost.

The following figures include this pattern charge.

Pattern Number	Total Pattern Cost	Pattern Cost Per Casting	Total Cost Casting	Total Cost Welded Steel
D-5607	$10.00	$2.00	$12.84	$ 7.60
SM-1228	10.00	2.00	5.80	3.77
SA-622	10.00	2.00	4.58	2.40
Base	15.00	3.00	5.45	2.25
GC-51	30.00	6.00	8.10	1.95
KG-1524	75.00	15.00	32.78	11.78
KG-8770	30.00	6.00	28.95	11.50

Total cost castings including pattern $98.50.
Total cost welded steel construction $41.25.
Saving $57.25.
Percentage saving 58.

**Paper submitted as an entry for the Lincoln Arc Welding Prize.*

†McMyler-Interstate Co., Bedford, Ohio.

DAVID AHLDIN

It is with great sorrow that we record the death of Mr. David Ahldin, one of the foremost engineers in the acetylene industry in the United States, who died on September 6th after an illness of less than two days. Mr. Ahldin was born in Stockholm, Sweden, July 28th, 1880. He was educated in Sweden and was graduated from the Swedish Naval Academy as Ship's Architectural Engineer. Shortly following his service with the Swedish navy he became associated with the De Leval Company of Sweden and later with the Swedish Gas Accumulator Company. He was one of the first engineers to give very much attention to acetylene when the properties of that gas were in process of discovery and early development. Its usefulness for marine lighting was the principal

David Ahldin

subject of Mr. Ahldin's early researches. He was associated in this work with the celebrated Swedish investigator, Dalen. His first trip to the United States was in 1910 when in connection with his association with the Swedish Gas Accumulator Company and the American Gas Accumulator Company he supervised the installation of acetylene lights in the Ambrose Channel and followed with the installation of other lighting equipment along the Coast for marine purposes. His activities in the field of marine lighting took him to nearly every civilized country in the world. He was associated for some time with the American Gas Accumulator Company in the United States and in April, 1911, became chief engineer for the Commercial Acetylene Supply Company of New York City. On April 1st, 1924, he joined the organization of the Keith Dunham Company, Chicago, as engineer in charge of acetylene installations for that company, which position he held at the time of his death. He is survived by a widow, Mrs. Ethel M. Ahldin.

As an engineer, Mr. Ahldin has been an important factor of the acetylene industry. He was widely known for his thorough knowledge of the subject and for his application to the study of all phases of it. He has contributed much to the literature of the industry, for which full credit has not always been recorded, but the value of this work nevertheless is strongly felt. There is no doubt that he treasured friendships more highly than personal glory, and he will long be remembered by his friends in the industry on account of his fine friendly character and his willingness to be helpful on any and all occasions. The genuine heartiness in his manner was to his friends a constant reminder of the pleasure he took in knowing people, associating with them, and being of whatever service he could to them. In recognition of his splendid capabilities and of his peculiar talent for cooperative work he was elected president of the International Acetylene Association in 1922 and at the close of his term of office was highly complimented by the members of the Association for his splendid administration. He will be greatly missed by all members of the acetylene industry, both as a friend and as a fellow worker.

DR. KARL BUNG

News has just been received from Germany that Dr. Karl Bung, Cologne, one of the foremost research engineers in the welding industry in Europe, died early this month as a result of an electric shock received while doing experimental work in his laboratory. Dr. Bung, who was 33 years old at the time of his death, had been conducting a series of very interesting experiments on the subject of electric arc welding. One series of experiments which he has described in recent papers employs the oscillograph to interpret the fine variations of amperage and voltage which take place during the deposition of metal with the arc. He also conducted some experimental work with motion pictures and produced a film which made it possible to slow down operations to such an extent that the work done in 6 seconds required 12 minutes for projection. He was just making final preparations for a visit to the United States at the time of his death. He had made arrangements to read a paper for the Fall meeting of the American Welding Society in October and was planning an extensixe trip through the United States for further study and lecture work. Dr. Bung's talents had already resulted in valuable contributions to the study of the art of electric arc welding and the tragedy of his death means a distinct loss to the welding industry.

TECHNICAL ADVICE OFFERED TO USERS OF ACETYLENE

Users of acetylene and various kinds of acetylene apparatus are often confronted with problems of installation, operation and maintenance which have been successfully handled by other users, but in some cases new problems arise which require experiment and consultation with engineers who specialize in acetylene subjects.

The International Acetylene Association offers to all users the services of its Oxy-Acetylene Committee and its Technical Engineering Committee. Any problems submitted to these committees will receive careful consideration of experienced engineers and every effort will be made to provide the soundest advice in each case.

INTERNATIONAL ACETYLENE ASSOCIATION TO MEET IN NOVEMBER

The annual meeting of the International Acetylene Association is scheduled to take place November 14-15-16 at the Stevens Hotel, Chicago, Illinois. A great deal of work has already been done on the preparation of suitable program for this meeting. As the plans for the program are not complete at this time full details will be published in the next issue of The Welding Engineer. The annual meeting of the International Acetylene Asociation is customarily an occasion for reviewing important developments of the past twelve months and discussion of questions of interest to manufacturers and users of acetylene and acetylene apparatus. The coming meeting will be no exception. A number of papers have already been definitely scheduled for the technical sessions which will contribute a considerable amount of valuable information on the use of acetylene in various industries.

National Metal Week Features Welding

Every Welding Process Will Be Displayed for Close Examination at the National Metal Exposition at Philadelphia, October 8th to 12th

Technical sessions of a number of engineering societies, plant inspections and a huge exposition of steel and steel working processes are on all the program of National Metal Week at Philadelphia starting October 8th. A feature which will attract a great many visitors from the Philadelphia territory, and also from distant points, is the National Metal Exposition which will be held at the Commercial Museum. The American Welding Society has arranged its annual Fall meeting to take place at the Bellevue Stratford Hotel, Philadelphia, coincident with the annual convention of the American Society for Steel Treating and the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers; and for the second time the Exposition of the American Welding Society will be held as part of the Exposition of the American Society for Steel Treating, under the combined title of the National Metal Exposition. This means that the week of Oct. 8th offers to all plant executives who are interested in welding operations opportunity to find gathered together, under one roof, equipment and materials for all of the different welding processes with opportunities to watch demonstrations of the latest technique which has been developed during the past year. At the time of publication of this issue of *The Welding Engineer* all of the exhibitors in the welding section of the National Metal Exposition had not been able to announce complete details regarding their exhibits. A number of them, however, had their exhibits definitely planned and the following advance information will give the prospective visitors an idea as to the value of these exhibits to plant managers in metal working industries:

The Electronic Tornado

One of the interesting developments in the field of electric arc welding during the past year is the development of a process called the Electronic Tornado of the Lincoln Electric Company, Cleveland, Ohio. A feature of the accomplishments of this process is the high degree of ductility obtainable in the welds. The Electronic Tornado process depends upon a device which has been produced to superimpose a strong magnetic field on the arc, to keep it controlled, focused and localized so that all of the heat of the arc is concentrated in a very small area directly under the electrode. A speed of 60 feet per hour on butt welding ¼-inch plate is claimed for the process. Samples of the work done on it will be on display at the Lincoln booth and complete data and information regarding it will be available. Another important part of the display in this booth will show the complete story of the replacement of castings by welded steel in the construction of machinery.

Automatic Arc Welding Developments

The exhibit of the Una Welding and Bonding Company will show arc welding machines built on the dynamotor principle, which makes possible the maintenance of any set current even after the machine has been welding continually for a number of hours. For those who are interested in arc welding there will be a display of a new type of automatic arc welding head and a new type of high speed electrode, specially developed for automatic welding. This electrode is prepared in such a way as to cause the welding material to be deposited in small quantities at short, regular intervals, the purpose of which is to increase the speed of the work and cause the arc to operate with greater stability with a view to securing a more uniform quality of deposited material. Plant managers who use dies extensively will also be interested in a special rod which has been developed for the repair of dies and building up wearing surfaces. A special rod has also been developed for welding high manganese steel to produce a relatively dense and non-porous deposit of high manganese. This result is accomplished by use of a special coating applied to a low carbon base rod.

Reduced Cost of Thermit Welding

The Metal and Thermit Corporation will exhibit materials and methods of thermit welding and will have completed welds on exhibition. They will also exhibit carbide, alloys and chromium plate. The welding exhibit will show a new method of thermit welding which reduces the amount of material and equipment and results in considerable savings in cost.

Fitting Equipment to Plant Requirements

One of the important questions facing the man who is either installing arc welding for the first time or plans an increase to his present installation is the selection of equipment of the proper capacity to take care of his estimated requirements. Welding sets with capacities ranging from 200 amperes to 400 amperes will be displayed at the exhibit of the Westinghouse Electric and Manufacturing Company. All of this equipment will be properly labeled by means of large placards pointing out the distinctive electrical and mechanical features and a representative will be on hand to answer questions and give visitors useful information on how to determine the capacity of equipment for different classes of work. The exhibit will show some of the radical changes and the progress made in welding machine design during the last few years and note the importance of designing some machines specially for particular welding applications. Welding demonstrations of one of the single operator machines will give visitors an opportunity to test the welding characteristics of the generator.

Testing Welds and Welding Wire

It is important for a welding supervisor to know something about the procedure for testing welding wire and sample welds and one who is interested enough in the work to read up on the subject can profit by having the knowledge of the wire drawing process. These things will be available to visitors at the booth of the Wickwire Spencer Steel Company, who will have a wire drawing machine to show the process of wire drawing, a welding machine in operation and a testing machine. Any user of welding wire will be interested in the information which can be obtained from a display of this character.

Economical Cutting of Steel Shapes

The use of fabricated steel for welding machine frames and machinery parts gives mechanical cutting a new interest. The raw material of a machine builder who goes to welded construction is an assortment of stock shapes of rolled steel. In preparation for assembly into completed machine parts this material has to be cut to size just as lumber is cut to size by a carpenter. Mechanically operated oxy-acetylene torches make possible the highest degree of uniformity in cutting these shapes and the automatic machinery for this work has proven to be a great time and gas saver. This mechanical cutting equipment will be displayed and demonstrated at the booth of the Air Reduction Sales Company, manufacturers of the oxygraph and the radiagraph, two well known mechanical cutting machines. In addition, this exhibit will include a new line of welding and cutting torches and a display of welding gas and supplies for oxy-acetylene welding. It is expected that there will be an opportunity to demonstrate a new model mechanical cutting machine for production cutting of shapes from steel plate.

Strong Seams in Sheet Metal Quickly Made

In the large area from which the Exposition is accessible are a great many manufacturers of sheet metal products. Superintendents in these plants are watching with growing inter-

est the rapid strides which have been made in recent years toward the perfection in equipment for resistance seam welding. It offers the solution to a great many of their assembly problems. At the booth of the Gibb Welding Machine Company visitors will see the latest Gibb seam welder which makes strong leak-proof seams in sheet metal. This firm will also show a new portable 300 ampere A. C. arc welder and a machine called a welding press which automatically makes electric spot welds with unusual speed. Another interesting development in resistance welding which will form part of this exhibit is a low powered fast operating bench welder for extremely light work. In order to help visitors determine whether the kind of assemblies in their plants are susceptible to welding by the resistance process the Gibb Company will have an elaborate display of samples of products welded by the resistance process. This part of the exhibit will be particularly valuable as an indication of the scope of resistance welding in the manufacturing field.

Correct Methods of Using Copper Alloys

Comparatively few plant executives are familiar with the possibilities of welding with bronze and other copper alloys. Laboratory research and experimental work in large railroad and industrial shops during the past year have demonstrated that there are scores of very valuable uses for copper alloys in welding. The results of these investigations will be available to visitors at the booth of the American Brass Company, where bronze welding will be demonstrated at regular intervals throughout the time of the Exposition. Skilled engineers will be in attendance to explain the fundamental principles of the adaptation of bronze welding, to give welding supervisors first hand instruction on the proper technique to follow. Many mistakes have been made by neglect of a few fundamental principles of operation and men who wish to get the best results from this process will do well to acquaint themselves with correct methods which have been developed and thus avoid the mistakes which have led others to consider that results from the process are uncertain.

For Railway and Similar Work

Railway men will be interested in the gas-electric rail car welder to be demonstrated by the Electric Arc Cutting and Welding Company. This complete welder mounted on wheels to fit standard tracks is made up for use both by steam and electric lines. It carries a Dualarc generator which has a reversible series field so that both the carbon arc and the metallic arc can be used. It is so constructed that it will deliver alternating current as well as direct current, alternating current being recommended for nickel spot on cast iron and malleable iron; also to operate a bank of lamps, electric grinders, chip hammers, etc. An air compressor is installed as regular equipment if desired. The combination of portability with great flexibility of operation suggests a wide range of use for a single unit which is particularly attractive to men in charge of work involving jobs of many different characters. Another interesting feature of this company's exhibit will be the Alternarc line of arc welding and cutting transformers. A comparatively recent development is the use of the transformer for cutting stainless steel and metal which is coming into common use and which has been found possible to cut to great satisfaction by using the electric arc.

Butt Welding with Spot Welder

The Acme Electric Welder Company will exhibit a 35 KW spot welding machine with a 48 inch throat embodying a number of new features such as adjustable lower horn and water cooling electrodes. A feature of additional interest is a butt welding attachment which can be attached to most models of spot welders, making it possible for a man who uses a spot welder regularly to do occasional butt welding jobs by the aid of an adjustment requiring a few minutes time. A new power driven spot welder will also be shown in action.

Speed Welding and Strength Welding from One Machine

Those who follow closely the development in the construction of arc welding machinery will be interested in two welding machines which will be exhibited in the booth of the Wilson Welder and Metals Company. These two machines are the Wilson type 200 ampere, 1-arc motor driven unit with a welding range of 10 to 300 amperes, and the Wilson type 200 amperes, 1-arc gasoline driven unit with welding range from 10 to 300 amperes. A complete demonstration will be given of the motor generating unit. Visitors will note that these welders are equipped with a new control panel which has no live parts in the front of the panel. New rotary switch together with a new design of field rheostat afford a very fine adjustment of the welding current. The demonstration will show how these machines are adapted to a heavy current and large diameter electrode when rapid deposit of metal is required and also to a short arc with exceedingly close regulation of the welding current for strength welding and repair work. There will also be exhibited Wilson color tipt welding wire and welding accessories. Various grades of the wire will be displayed, illustrating the policy of the Company to supply a grade of wire for each kind of metal.

Electrical Heat

R. D. Thomas & Company, Philadelphia, will have an exhibit including equipment to show all of the various processes for utilizing electricity as a means of generating heat. The processes to be covered are electric arc welding, electric spot welding, electric seam welding, electric furnaces, arc welding electrodes, and accessories. 12 different grades of arc welding electrodes will be displayed and a welding expert will be in attendance to give advice to interested parties regarding the selection of electrode material for particular classes of work.

Selection of Welding Wire

Those who are especially interested in the subject of wire for either gas or electric welding will find it worth while to spend time at the booth of John A. Roebling's Sons Company, one of the foremost American manufacturers of wire and wire products. An attractively furnished booth will display bundles of both electric welding wire and gas welding wire and representatives of the Company who specializes in the study of welding operations and the development of wire to meet the requirements of different kinds of operations will be in attendance to greet visitors and assist them in procuring broader information on the subject of the selection and use of welding wire.

Making a Hard Wearing Surface

Stellite is a metal which is attracting a great deal of attention in many industries because of the many uses which are being found for a metal which provides an extremely hard service. The Haynes Stellite Company will exhibit products such as tool bits, bar stock, welded tools, milling cutters and other tools used for machining cast iron, malleable iron, semi-steel, brass, bronze, mild steel, etc. In many cases it is unnecessary and perhaps inadvisable to make up a complete piece of Stellite, so the process has been developed to apply Stellite where it will do the most good. The exhibit will include apparatus necessary for the Stelliting process and the method of applying Stellite so as to get the best results will be demonstrated throughout the Exposition.

A New Gas Pressure Regulator

A new piece of equipment which will be of interest to all visitors who use the oxy-acetylene torch for either welding or cutting is the new K-G oxygen and acetylene regulator, a regulator of entirely new design which has recently been perfected by the K-G Welding and Cutting Company. Their exhibit will include complete demonstrations of the construction and operation of the new type of regulator. It will also have on display a complete line of welding and cutting torches involving interesting features of construction.

More Uniform Spot Welds

A unique product in the resistance welding industry is a copper tungsten alloy called Elkonite. This is manufactured by the Elkon Works, Inc., and its uselfulness in resistance welding will be shown to visitors at the Elkon booth. It has the interesting property of adding greatly to the life of electrodes and clamps used in spot, butt, flash and seam welding. For many types of welding operations performed by the resistance process it offers the additional advantage of adding to the uniformity of the results secured by maintaining the electrodes, clamps, etc. in uniform condition for a much longer period than can be obtained when using copper alone. Because of its peculiar properties it is not featured as a cure-all for resistance welding operations but visitors are invited to investigate its records of performance and determine by trial whether they can use the alloy to advantage. Incidentally, it has made possible some remarkable accomplishments in the use of projection welding and the engineers of the company will be on hand to tell visitors about the possibilities of that particular process.

Welding for Ornamental Iron Workers

Among the interesting features of the display of Rego oxy-acetylene welding and cutting equipment in the booth of the Bastian-Blessing Company will be an operating exhibit designed to illustrate the application of welding and cutting to the ornamental iron industry and the showing of an acetylene generator in action showing the construction and method of operation. There will also be shown an oxygen manifold which will be of interest to those in charge of installations which require the piping of oxygen to various points in the plant. Representatives in attendance will be prepared to give information and suggestions to those interested in the installation of manifolds.

Flame Test for Welding Wire

Research engineers of the Page Steel & Wire Company have developed a simple and useful test for different grades of welding wire, which is known as the flame test. The exhibit of this Company will be in charge of expert welders who will be prepared to show visitors how to use this interesting proceedure for the inspection of welding wire. The exhibit will also include a showing of various grades of welding wire and a new method of packing wire in 10 pound containers for garages and other small users. The exhibit will also include samples of bridge wire and ferrules used in joining the wire in the Philadelphia-Camden bridge, the Mount Hope, Rhode Island bridge, and the Detroit-International bridge, the latter two being under construction.

For Small and Large Cutting Jobs

In oxy-acetylene cutting operations the selection of equipment is usually a matter which depends upon the nature of the work to be done. For some kinds of work a one-piece cutting tip is desirable, and for other types of work a two-piece tip is desirable. Both methods of construction of the cutting tip will be shown at the Torchweld Equipment Company booth and visitors will be assisted in learning how to make the proper selection to suit their work. The display will also include a showing of a cutting attachment for the Torchweld welding torches which makes it possible for a welder who has occasional cutting jobs to do to dispense with the use of a complete extra cutting torch and to go from welding to cutting without making a number of changes in connections to tanks, etc. The rapid development of airplane construction has called for a number of oxy-acetylene welding installations and the Torchweld Company has recently brought out a new model torch specially designed for use in airplane work. They will also have on display their new model gas pressure regulator which is the safety release valve which gives relief from an excess pressure without the use of a breakable disk which has to be replaced. In other words as soon as the excessive pressure is gone the regulator returns automatically to its normal condition.

Electric Welding for Pipe Lines

The principal feature of the Fusion Welding Corporation exhibit will be the welding of pipe, using a special coated electrode which is designed to give extreme penetration, and a copper backing plate inside the pipe. Two sections will be welded each day, and a tensile testing machine will be installed in the booth to test samples of the welds made in this manner. A number of types of electrodes for mild steel welding and for stainless steel welding will be displayed. A completely arc welded stainless steel annealing pot will be exhibited. A 300 ampere motor generator Fuzon Arc Welder will be in operation, and a Fuzon gas engine driven welder mounted on automobile wheels with pneumatic tires will be on display.

Combination Torch Saves Time

The apparatus displayed in the booth of the Alexander Milburn Company will include not only a complete line of acetylene generators, oxy-acetylene welding and cutting apparatus, carbide lighting equipment, but also an improved paint spray gun with interesting adjustment features. An important feature of the welding apparatus display will be the combination cutting and welding torch adapted to many classes of work where both welding and cutting may be required on the same job. Demonstrations will show the possibilities of saving both gas and time as well as saving the cost of an extra torch.

Although it is possible to hit only the high spots of the exhibits in such limited space as is available here, it will be apparent to every reader that a visit to the Exposition will reveal many new and interesting welding developments. In addition to the displays already described there will be exhibits of corresponding interest and value by the following firms who have reserved space at the Exposition: Transportation Engineering Corp., American Steel & Wire Co., Linde Air Products Co., General Electric Co., Federal Machine & Welder Co. Detailed information regarding these exhibits was not received in time for publication in this issue.

As mentioned in the beginning of this article, the American Welding Society will hold its Fall meeting in the Bellevue Stratford Hotel during the week of the Exposition. The Exposition will be open to visitors on afternoons and evenings only, so that there will be plenty of time to attend all of the morning sessions of the American Welding Society and those who desire to attend the afternoon sessions can do so and still have an opportunity to visit all of the booths on the days when the exhibits are open after the dinner hour in the evening. The exhibits will close at 6:00 P. M. on Tuesday and Thursday and will be open until 10:00 P. M. on Monday, Wednesday and Friday evenings. The program of the Fall meeting of the American Welding Society at the Bellevue Stratford Hotel is as follows:

MONDAY, OCTOBER 8, 1928

Morning

Registration. Registration facilities will be provided for members and guests at the Bellevue Stratford Hotel, commencing Monday, October 8th, at 10:00 A. M., and at Commercial Museum, commencing Monday at 12.00 M. A registration fee of $1.00 will be charged members and their male guests.

Afternoon

Meeting of Board of Directors, American Welding Society, 2:00 P. M., Bellevue Stratford Hotel, Assembly Room.

TUESDAY, OCTOBER 9, 1928

Morning

Business Session

10:00 A. M.—Bellevue-Stratford Hotel.
This will be more in the nature of a few introductory remarks by President Llewellyn and transaction of any formal business or introduction of local celebrities.

Technical Session

10:30 A. M.—Bellevue-Stratford Hotel, F. T. Llewellyn, President, presiding.
Welding in Heating, Ventilating and Plumbing Industry, by R. A. Jack, Domestic Engineering.
Testing Joints for Aircraft Structures Prepared Under Procedure Specifications, by H. L. Whittemore, Bureau of Standards, and H. H. Moss, Linde Air Products Company.

Afternoon

Technical Session

2:00 P. M.—Commercial Museum. Lecture Room, F. M. Farmer, Past President, presiding.
Welds at Elevated Temperatures, by Professor C. Moser, Leland Stanford University.
Formula for Computing Design Stresses for Pressure Vessels, S. W. Miller, Union Carbide and Carbon Research Laboratories.

Evening

GRAND BALL

9:30 P. M.—Grand Ball, Benjamin Franklin Hotel, Ball Room. Admission by Ticket Only.

WEDNESDAY, OCTOBER 10, 1928

Morning

Technical Session

10:00 A. M.—Bellevue-Stratford Hotel, R. D. Thomas, Chairman, Philadelphia Section, presiding.
Running a Successful Job Welding Plant, by J. S. Oechsle, President, Metalweld, Inc.
Welding in the Automobile Industry, by J. W. Meadowcroft, Asst. Works Manager, Edward G. Budd Manufacturing Co.

Afternoon

Inspection Trip

2:00 P. M.—Inspection Trips have been arranged to places of interest to members in Philadelphia. Tentative arrangements have been made for visiting the General Electric welded building, the plant of the E. G. Budd Mfg. Co., and an aeroplane plant.

THURSDAY, OCTOBER 11, 1928

Morning

Joint Pressure Vessel Committee

10:00 A. M.—Bellevue-Stratford Hotel, E. H. Ewertz, Chairman, presiding.

Afternoon

Technical Session

2:00 P. M.—Commercial Museum, Assembly Room. A. G. Oehler, Past President, presiding.
Design of Welded Structures, by F. P. McKibben, Consulting Engineer, General Electric Co.
Erecting a Building by Welding, by J. F. Lincoln, Lincoln Electric Co.
Oxy-Acteylene Cutting in the Structural Field, by H. E. Rockefeller, Linde Air Products Company.

Evening

Annual Banquet and Dance

6:30 P. M.—Bellevue-Stratford Hotel, Annual Banquet and Dance.

FRIDAY, OCTOBER 12, 1928

Morning

Technical Session

10:00 A. M.—Bellevue-Stratford Hotel, H. L. Whittemore, presiding.
Design of Machinery Parts by Use of Welding of Steel Shapes, by Messrs. Hague, Marthens and Brinton, Westinghouse Electric & Mfg. Co.

Afternoon

American Bureau of Welding

2:00 P. M.—Bellevue-Stratford Hotel, Director C. A. Adams, presiding. Meeting of American Bureau of Welding.

Evening

Structural Steel Welding

8:00 P. M.—Bellevue-Stratford Hotel, J. H. Edwards, Chairman, presiding.
Meeting of Structural Steel Welding Committee.

MODERN METHODS OF FABRICATING BRONZE SCREENS

After many years of use of iron, galvanized iron, and copper wire, each of these materials has failed for one reason or another to serve successfully as a screen material. Iron wire screen, of course, requires yearly painting to give it even brief existence, while in some climates the life of the galvanized iron wire screen is almost as brief. Copper wire cloth resists rust in most climates with entire success, but its strength is insufficient to give satisfactory service. The use of bronze wire cloth, which is merely a strengthened copper, has been the solution of the problem of obtaining the right material for screens.

Then arose the problem of a permanent frame for a permanent screen material. A report from the International Acetylene Association, tells us how this has been solved by the introduction and use of a frame fabricated from a material corresponding to the wire used in the cloth, the most satisfactory of these materials being what is known as commercial bronze and red brass. The former is an alloy of 90 per cent copper and 10 per cent zinc, and the latter is 85 per cent copper and 15 per cent zinc. Red brass, having a lighter color, finishes up to harmonize better with the cloth and also as a rule with the color of paint generally used on residences and apartment houses than the other.

Because red brass and commercial bronze contain zinc, it is difficult to make the joints by spot welding as can be done when galvanized iron or steel is used for the frame material. It, therefore, is necessary to use the oxy-acetylene process in welding these screen frames, and entire success in this work is made easily possible by using the smallest size welding torch, producing a flame having a cone about the size of a lead pencil point, and filler rods known as Tobin or manganese bronzes. These welding rods are alloys of copper and zinc, in each case of approximately 60 per cent copper and 40 per cent zinc. The alloys differ in that Tobin bronze contains 1 per cent tin, and manganese bronze 1 per cent each of iron and manganese. Being high in zinc as compared witth the red brass and commercial bronze used in the frame materials, these welding rods melt at a much lower temperature so that in making the welds it is not necessary to melt the red brass or commercial bronze but only to bring them up to a dull red heat and melt the Tobin and manganese bronze on the heated surface. A good brazing flux is essential in this work.

By following the foregoing suggestions, any good oxy-acetylene welder should be able to make neat and rapid work in the fabrication of permanent screen frames. When discoloration of the metal must be avoided these frames may have to be soldered instead of brazed or welded. A very quick and neat job of soldering is possible by the use of the oxy-acetylene torch. Some manufacturers use dozens of oxy-acetylene torches in soldering with very great advantages over other forms of heat.

Economies in Oxy-Acetylene Riser Cutting*

Waste of Gases and Inefficiency of Cutting Operations Can Be Eliminated by Giving Attention to a Few Important Factors of Procedure Control

By Glenn O. Carter†

THE oxy-acetylene cutting of risers is such an important part of steel foundry work that in the last few years it has had a fair share of attention. There are, however, many phases of the application where practices have not been standardized.

It is certain that the efficiency of cutting has improved and in practically all foundries the cost per ton of product has been reduced in the last five years. On the other hand the very ease with which risers and gates may be removed has resulted in increasing the cross section to be cut and this tends to increase the cost of cutting per ton of finished product.

Because cutting is a part of the manufacturing system it must

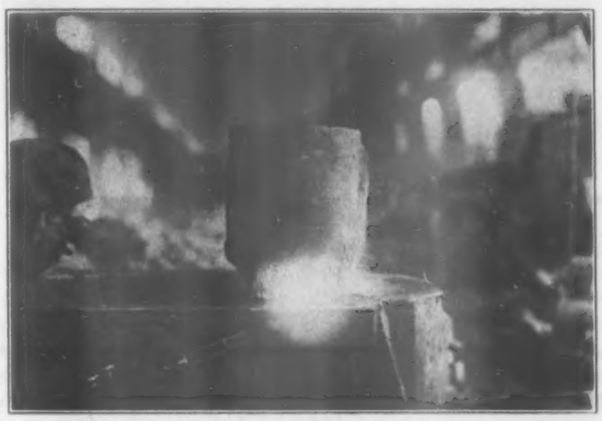


Fig. 1—The Oxy-Acetylene Cutting Torch Has Proved by Far the Most Efficient Means of Removing Risers from Castings.

go along in reasonably close step with the output just as the sand blasting or cleaning must be done. This puts a premium on "getting out" the work as compared with efficiency of cutting.

In many foundries one cutter is expected to take care of all work but because the cost of the gases is much greater than the labor cost it may pay to aim for maximum efficiency rather than tonnage. The cost of gases for cutting steel five inches thick is approximately 8 times the labor cost and for steel ten inches thick it approximates 16 times. As thickness increases the ratio of gas cost and labor cost increases.

There is still another factor that enters into this problem of efficient cutting yet the figures do not always appear in studies of cutting costs. The grinding of the casting to remove all traces of risers, gates and fins is another considerable item of cost and closeness of cutting affects the grinding very materially.

Certain practices advocated by the author in a paper read before your society several years ago are recognized as being just as suitable now. To supply oxygen and acetylene through pipe lines was then the practice in a few foundries. It is now general. Oxygen cylinders are connected to manifolds that are conveniently located for handling of cylinders. Acetylene is generated on the premises from calcium carbide and is supplied at suitable pressures up to fifteen pounds per sq. in. (Never in excess of this for safety reasons).

Connecting apparatus to single cylinders brought into the cleaning room is seldom done now because of the cost of extra handling of cylinders and the possibility of damaging cylinders from the moving around of castings.

More attention is now paid to equipment than was the case just after the war and attention is also paid to the use of correct gas pressures. Regulators attached permanently to pipe lines or at manifolds naturally do not give the trouble formerly experienced with regulators that were being shifted many times a week from one gas cylinder to another.

The attention paid to apparatus is another result from close attention paid to costs. Sudden rises in gas consumption per unit of work has pointed to defective cutting equipment as was noted by Mr. R. W. Thomas of the Vulcan Iron Works in a paper read before The International Acetylene Association in 1925. This paper, by the way, included many other good pointers about cutting.

Fig. 2—Clean, Smooth Cuts Can Be Made With the Torch, Reducing Subsequent Grinding and Machining to a Minimum.

Another practice on which the seal of approval has been placed by many foundries is the separation of castings into groups according to size of risers so that there will be a minimum changing of equipment and of pressures. No one blowpipe tip is suitable for cutting five inch steel and also either two inch or ten inch thick metal. A constant changing of tips is a waste of time and damages apparatus, although changing tips is cheaper than miscellaneous cutting with one tip.

The necessity for the proper welding tips is of course largely a matter of efficiency of the cutting operation, but it also greatly affects the cost of cutting. Larger tips and higher oxygen pressures than normal will greatly increase the consumption of oxygen for the same thickness of cut.

In some places cutting blowpipes having different sizes of tips are kept hooked up so the change from one size to another is almost instantaneous. This is specially recommended where fins are cut as they seldom require more than the smallest size of cutting jet.

The use of the oxy-acetylene cutting process has enabled designers of castings and the makers to undertake work hardly pos-

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*Paper read at American Foundrymen's Association convention at Philadelphia, May 15, 1928.

†Consulting Engineer—The Linde Air Products Company, New York, N. Y.

sible otherwise. This was well noted by Mr. Thomas in his paper previously mentioned.

Larger risers and more pouring gates are now used than in earlier steel foundry practice because an ample reservoir capacity above the casting is essential to compensate for shrinkage and thus prevent pipes or blowholes. The foundry is in this way surer of getting a good casting than when small risers and gates are used.

The location of risers is of importance in casting and although it is advantageous to have risers so placed as to permit of straight cutting this is not essential with oxy-acetylene cutting as with mechanical cutting. Frequently such an excess of metal is used as to make continuous risers like in cylindrical sections.

For cutting material other than risers there are a few helpful suggestions that can be offered.

When the cutting section is very extensive there is a heat effect that must be watched. Cutting with oxygen does not harm the metal if the cut is reasonably smooth but the heat may cause

Fig. 3—Ease of Removing Risers With the Torch Has Given Greater Latitude in the Number and Position of Risers, Resulting in Better Castings.

warping. In these cases it will pay to heat slabs before shapes are cut out with the blowpipe.

Some study has been given to the use of machine operated blowpipes. So called straight line cutting machines can be used without much trouble, and much of the operator's time is thus saved in cutting on work which is fairly heavy, such as ten in. and up.

With machine control there is a decided saving in gases and the finished work should require a minimum of grinding. This phase of cutting requires the interest and study of the manager and the superintendent, and there may be a real reward for the effort.

Another application of the oxy-acetylene process has had further study in the not distant past. The welding of defects in iron and steel casting is quite an item in all foundries. One way of facing this is so to limit the use of welding that the repaired section will not be subjected to stress. This will allow of very low grade workmanship for mere filling in operations but it is not in accord with present tendencies in other directions in welding.

There is the alternative of using oxy-acetylene welding as a strength element. The steel foundries have not come to this use in any such way as some of the gray iron foundries have. The splendid description of oxy-acetylene welding installation at certain automobile engine casting foundries give details as to the correct practices for use of welding as a strength carrying detail.

It may be that the steel foundries have not come to a full appreciation of correct welding practices beginning with qualifying of operators, the use of suitable high grade filler materials and the use of adequate preheat.

The recent article by Mr. R. H. Bull, "When Should Steel Castings be Welded in Foundry"? gives a cue as to a clever and suitable way of testing workmanship. It is certain that the expense of testing is offset by the reduction in other costs. Adequate checking of welding certainly repays the management wherever welding is used.

The use of the oxy-acetylene weld as a structural element is of

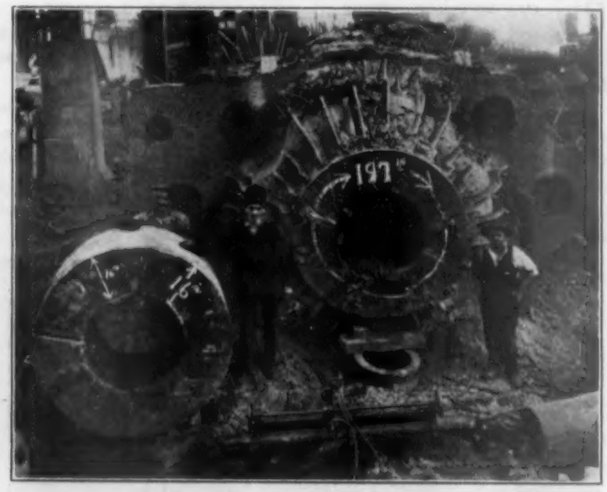


Fig. 4—11-Ton Riser Cut from 65-Ton Forging Press Base.

growing importance to the steel foundryman on the side of developing or holding business.

High grade steel castings can be and are being joined to pipe and plate steel by oxy-acetylene welding so as to give a finished product better than can be made by use of pipe or plate alone. The reason is that very simple therefore dependable castings can be made to give adequate thickness of metal at points of maximum stress. Then relatively thin sections of rolled steel can be used at high working stresses where the section would be too thin or too complicated for satisfactory castings.

STORTS USES INTERESTING EXPERIENCE FOR ADVERTISING COPY

Storts Welding Company, Meriden, Conn., recently undertook a welding job for a big manufacturing plant which netted the customer a saving of nearly $6,000.00. This job was contracted for repairing broken-down tote pans used in the plant. These would have been scrapped if Mr. Tierney, the president of the Storts Company, had not showed them how the tote pans could be put back into service by welding and reinforcing the corners. The Storts Welding Company has prepared an illustrated circular of just how this work was done, with diagrams showing how the welding operation made them better than new and is sending this circular out to a list of nearly 2,000 manufacturing concerns in the form of an illustrated letter. Job shop owners who want to see just how this progressive welding company goes after business of this sort will be able to obtain a copy of this circular by writing to Mr. J. D. Tierney, c/o Storts Welding Company, Meriden, Conn.

A particularly interesting feature of the circular is the last page, which shows by a series of diagrams three different ways to weld tank plate, one way giving a weld of smaller section than the plate itself; a second way shows the weld slightly reinforced to make the weld- stronger than the plate and a third way shows the reinforcement made on both sides, givin gthe effect of a small built-in post at each corner.

Stelliting by the Arc Process

Nature of Deposit Secured Under Different Operating Conditions—Effect of Coating—Hardness and Structure of Deposits

By C. M. Rusk*

IN THE August, 1927, issue of *The Welding Engineer* I gave the approximate saving in building up heavy abrasive surfaces with Haynes Stellite Electrodes by the electric arc method.

This month I will show what happens in the arc deposited metal using $\frac{1}{8}$" diameter Stellite Electrode bare and coated at current densities of 2400 and 3400 amperes per square inch, giving the actual pounds of metal used and deposited per hour and thickness $\frac{1}{8}$". Specimens No. 7, 8 and 9 had two layers, but differ from specimens No. 4, 5 and 6 in that they had three beads on bottom and one bead on top, maximum thickness $\frac{1}{8}$". The first six specimens were deposited with 187 amperes at 20 volts, and the last three with 250 amperes at 20 volts.

Coating "A" was used on specimens No. 1, 4 and 7.

Coating "B" was used on specimens No. 2, 5 and 8.

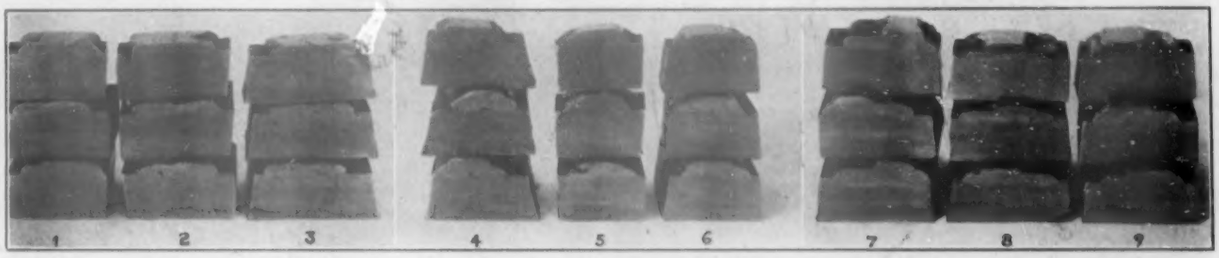


Fig. 1—Specimens of Stellite Deposits, Laid Down in Single and Double Layers, With Various Bare and Coated Electrodes.

lost by vaporization. Appearance, soundness, penetration, the hardness of deposited metal and of the parent metal adjacent to the deposit, are also shown.

The work was performed by the average good welding operator under shop practice so as to arrive at actual working conditions and not by those made in a laboratory.

Bare electrodes were used on specimens No. 3, 6 and 9.

The coatings were furnished by R. D. Thomas & Co., Philadelphia. The welds were made with the Westinghouse 500 ampere Constant Potential Motor Generator Set (this is a multiple operated type equipment) using reversed polarity. Specimens were made in the presence and at the direction of the writer.

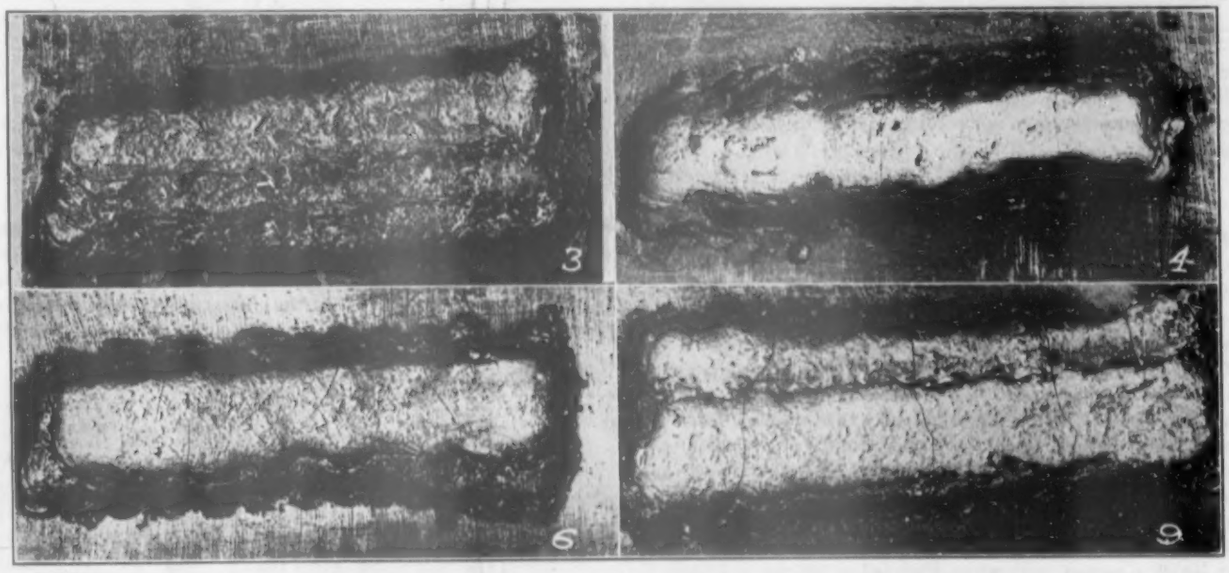


Fig. 2—Surface of Four of the Deposits Shown in Fig. 1. Welds 3, 6 and 9 Were Made With Bare Rod and Are Somewhat Porous. Weld 4 Was Made With a Coated Rod and Is Free from Surface Holes.

There were a total of nine specimens made up of 5"x5"x¾" mild steel plate.

The deposited metal on specimens No. 1, 2 and 3 was laid down in one layer of three parallel beads, maximum thickness of deposit ¼", each overlapping the other. Specimens No. 4, 5 and 6 had two layers, two beads on bottom and one on top, maximum

The amount of metal deposited and lost and time required for actual welding is shown in Table No. 1.

These figures show that the rate of deposition is almost directly proportional to the current and that the bare rod probably has a slightly lower rate than the coated.

This rate corresponds to a possible deposition of 8 lb. per hour, but as the figures are based on one electrode and hence do not include time lost in changing electrodes nor other possible losses,

*R. D. Thomas Co., Philadelphia.

we may assume 25% of actual welding time as idle time in arc welding. Therefore, 6 lb. per hour may be assumed as a fair rate for a good operator.

Appearance of Deposits

The specimens made with coated rod are free from surface holes, but the three made with bare rod are decidedly porous, especially near the edges of the deposit. This is shown by the photographs, but not as plainly as by actual inspection of the samples. Welds 3, 6 and 9 were made with bare rod, and No. 4 with coated rod.

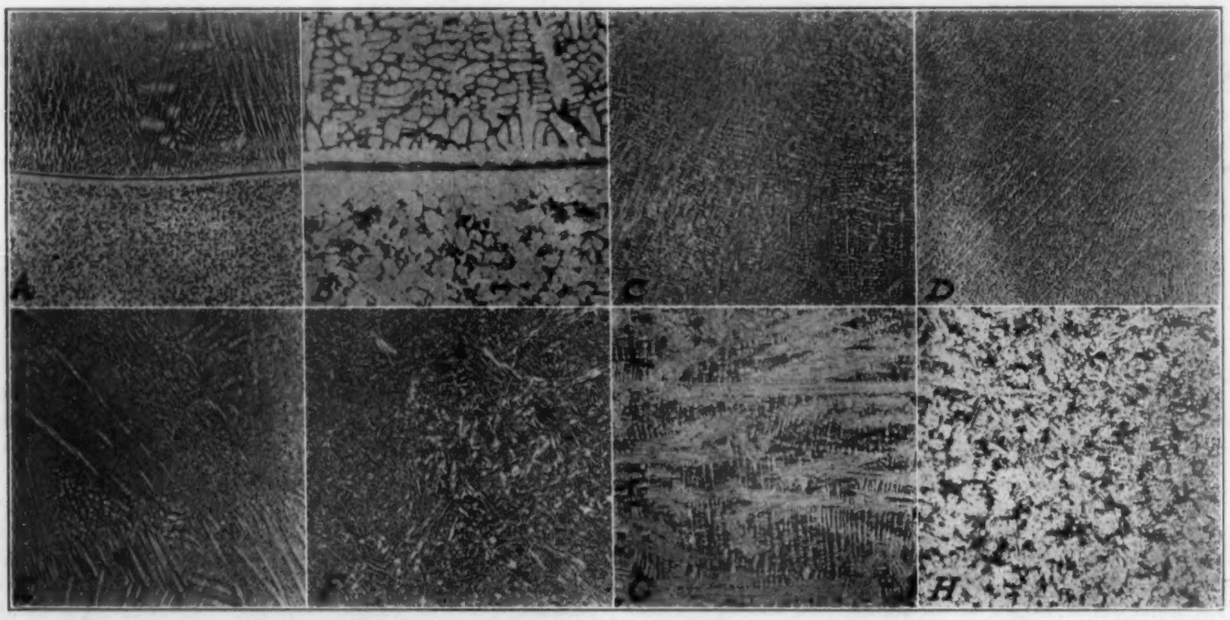


Fig. 3—Grain Structure in Steel, Stellite Rod, and Stellite Deposits Made With the Electric Arc and With the Oxy-Acetylene Flame.

Soundness of Deposit

A section about 1" long was cut from the center of each weld, and it was found that all the welds contained blow-holes except No. 7 (see Fig. 2), which was made under the conditions we have been recommending, i.e., with coated rod with a current of 250 amperes.

Penetration and Hardness

Hardness determinations were made on the cross-sections and are shown in Tabulation No. 2 by location, which is measured in $\frac{1}{16}$" from the original surface of the steel. The maximum penetration as indicated by the polished surface is also given.

In Figure 2, Sample No. 1 and 4 show few blow holes, poor fusion only about 10% of deposit. Penetration poor $\frac{1}{16}$" at sides of weld. Sample No. 2 shows only few blow holes, more than No. 1, poor fusion about 10% of deposit. Penetration poor $\frac{3}{32}$" at sides only. Sample No. 5 is almost free from blow holes, poor fusion about 20% slightly better than No. 2. Penetration $\frac{1}{32}$" at sides only. Sample No. 3 and 6 are very porous, filled with blow holes, very poor fusion, only about 5% of deposit, penetration $\frac{1}{32}$" at sides only. Sample No. 7 is free from blow holes, good fusion throughout weld, good penetration, $\frac{1}{16}$" average. Sample No. 9 is porous, with many blow holes, but not as bad as No. 3 or No. 6. Good penetration throughout weld $\frac{3}{32}$" average. Not as deep as No. 7 or No. 8.

All deposits made at 187 amperes show rounded edges and overlap at sides of deposit, while those made at 250 amperes show good, sharp corners, no overlapping at sides where weld metal meets parent metal.

In Figure 3:—(a) shows arc weld junction. Upper portion elongated grain structure is Stellite. Lower portion or fine grain is mild steel. (b) shows the same weld at five times greater magnification. This shows more plainly that these apparent long narrow grains which run almost perpendicular to the line of fusion are made up of a number of small and larger grains. It also shows the mingling of grains of Stellite and steel. Just above and below the line of fusion there appears to have been formed a carbide in both the steel and Stellite. (c), (d) and (e) show Stellite at various parts of the deposit. We still get this elongated grain appearance but the grains are becoming more refined. (f) shows the structure of No. 3 Stellite rod, $\frac{3}{16}$" diameter, which was used in making the specimens. (g) shows Stellite in a large sand casting. This differs from the rod structure (f) in that these elongated grains are much larger. Seem almost to be continuous throughout the structure. (h) shows deposit metal made by the oxy-acetylene flame.

The arc weld deposit shows a much finer grain structure than that made by the acetylene deposit. It is also finer than the sand casting. While this is a better condition to have in general steel welding, we are unable to tell whether this is or is not a beneficial condition in Stellite welding.

These test specimens give us very interesting data. It will be necessary to make further tests to determine all of the advantages of depositing Stellite by the metallic arc method and the use of coatings on the electrodes. However, we have gained enough information to prove that we can successfully and advantageously use the electric arc for this process.

TABULATIONS OF TESTS AND RESULTS

No. 1.

Specimen Number	Current Value	Time in Seconds	Weight in Grams	Metal Deposited in Grams	Metal Loss in Grams	% Loss
1	187.5	161	131	119	12	9.2
2	187.5	125	117	107	10	8.6
3	187.5	140	100	91	9	9
4	187.5	154	133	121	12	9
5	187.5	127	111	100	11	10
6	187.5	142	115	104	11	9.6
7	250	161	170	160	10	5.9
8	250	149	159	142	17	10.7
9	250	145	151	138	13	8.6
Average						8.85

Amperes Used	Specimen Number	Lbs. of Electrodes Used per Hour	Lbs. of Electrodes Deposited per Hour	Average Hours to Deposit 1 Lb. Elec.	Average % Loss by Vaporiz.
187	1	6.40	5.90	.163	9.20
	4	6.85	6.30		
	2	7.48	6.80		
	5	6.90	5.90		
250	7	8.40	8.00	.127	7.20
	8	8.50	7.80		
187	3	5.75	5.25	.181	9.29
	6	6.42	5.85		
250	9	8.30	7.65	.131	8.60

No.	Penetration	No. 2. ROCKWELL HARDNESS —1/8	—1/16	0	1/16	1/8	3/16	1/4
1	1/16		9	61	52	54		
2	3/72	1	52	50	53	54		
3	1/32		—8	10	51	51		
4	1/8	52	52	55	53	53	55	57
5	3/64			28	51	56	56	
6	1/32			50	56	58	60	
7	1/16			52	54	55	57	
8	3/32		46	47	53			
9	3/64			51	54	59	59	

Rockwell determinations were also made on the surfaces of the welds and the following data collected:

Weld No.	Rockwell
1	55-53
2	53
3	55
4	56
5	54
6	60
7	54
8	50
9	60

The results seem to indicate that the deposit made by the bare rod is slightly harder than that made by the coated rod, but more extended experiments would be needed to draw such a conclusion.

HUNGERFORD BRASS & COPPER PRODUCTS AND WATERBURY MANUFACTURING COMPANY PRODUCTS TO BE SOLD UNDER CHASE TRADEMARK

A recent announcement by F. S. Chase, President of the Chase Brass & Copper Company, Incorporated, states that all products formerly sold by the Waterbury Manufacturing Company and the U. T. Hungerford Brass and Copper Company, will now be sold under the Chase name and mark.

The new trademark, a figure half horse and half man with bent bow and drawn arrow—so aptly illustrative of the chase and so of the firm name—is distinctive and unmistakable. In addition to its use on all other products of the companies now amalgamated, it will appear on the well known Alpha Brass Pipe.

The first and original plant of the Chase Companies, Inc., was the Waterbury Manufacturing Company which was founded in 1837. It was formerly called Hitchcock's, and later became known as the United States Button Co. In 1876 it was incorporated under the new name of Waterbury Manufacturing Co., and in 1882 employed about thirty-seven men in contrast with the several thousand employed today.

So much brass was being used by 1900 that a new plant called the Chase Rolling Mill Company was built to cast and roll the metal needed. Gradually this second unit of the company entered the market as producers of Chase Brass sheet, rod, wire and tubing.

Later, in 1910, with a view to the future of the brass business, a second brass mill, the Chase Metal Works, was founded. It is today one of the largest and best equipped brass and copper mills in the country.

In 1917 these three plants were merged into the present Chase Companies, Inc. Four years later Chase brass and copper warehouses were started on the East and West coast, and additional warehouses were soon added in important manufacturing cities.

Last year the Chase Companies bought the assets of the U. T. Hungerford Brass & Copper Company, who also operated brass and copper warehouses in principal cities. Both the Chase and Hungerford chains of warehouses were united and merged into a separate company named the Chase Brass & Copper Co., Incorporated, which in addition to its warehouse business acts as the selling and distributing company for the products from the mills and factories of the Chase Companies, Inc.

CHICAGO SECTION STARTS FALL PROGRAM

The American Welding Society, Chicago Section, started its 1928-29 program of local meetings on the evening of September 14. It is planning to have the balance of the meetings held on the first Friday of each month. The speaker at the September meeting was Dr. L. Andren, chief metallurgist of the research department of the American Chain Company, and the subject of his talk was "Welding Metallurgy." Dr. Andren used a number of splendid lantern slides to illustrate the metallurgical information which is necessary for the proper understanding of correct welding procedure. Another feature of the September meeting was the showing of two reels of motion pictures prepared by the Gas Products Association. The meetings of the Chicago Section this year are being held in the Fraternity Room of the Great Northern Hotel, Dearborn Street and Jackson Boulevard.

HOW DO THEY GET THAT WAY?

Three members of the industry, from causes unknown, were temporarily affected recently with amnesia. Their wanderings were of a nature bordering on hardship it was evident when recognized. Their plight, it was thought, should be made the object of permanent record, so the Staff Photographer was rushed to

Informal View of Three Well Known Figures in Oxy-Acetylene Industry.

the scene—the evidence is herewith produced.

When last heard from the boys from Wisconsin, Mueller and Smith, were safely home in the bosom of their families and Campbell was still going west toward the Pacific.

JULY MEETING OF THE PERMANENT INTERNATIONAL COMMISSION

Thirteen countries were represented at the meeting of the Permanent International Commission of Acetylene and Autogenous Welding which met at Lucerne on July 3rd for its 7th session. The plans of this body are rapidly developing toward a more comprehensive program of comparative research and activity among various nations. It is stated that by combining and coordinating the efforts of the leading men in the acetylene industry in different countries a great deal more development work can be done with practical certainty of reducing duplication of effort.

LARGEST ARC WELDING LABORATORY SOON TO OPEN AT WESTINGHOUSE WORKS

In a statement announcing the near completion of the largest arc welding laboratory in the world, at the Westinghouse Electric & Manufacturing Company's East Pittsburgh plant, W. S. Rugg, vice-president, prophesies that rivets and iron castings are due to be supplanted in the near future by welding.

In a statement appearing in *Power*, Mr. Rugg says,

"Arc welding will, within a few years, supplant the rivet in structural work and, to a large extent, the foundry for cast machine parts.

"The progress that has been made in the arc welding of

various types of structures is strikingly demonstrated in a review of Westinghouse applications of the new method of steel erection. Within a comparatively brief period we have erected by the arc-welding process two buildings in our Sharon, Pa., works; one building in our Derry, Pa., works; seven buildings in our East Pittsburgh, Pa., headquarters; a bridge 55 ft. long at Turtle Creek, Pa., and a bridge 175 ft. long at Chicopee Falls, Mass. Altogether, these structures involved the arc welding of nearly 1,600 tons of steel.

"At the present time the Westinghouse company is planning three more buildings at Trafford, Pa., all of which will be welded."

The entrance of arc welding into the machinery fabrication field is given impetus by the new Westinghouse arc-welding laboratory, according to Mr. Rugg. This structure will be 75 ft. wide, 170 ft. long and 40 ft. high. The structure houses a 50-ton crane and in addition to the installation of arc-welding equipment, it will have massive rolling and forming equipment to be used for forming and shaping the various parts that go into welded machinery. These include motor frames, generator frames, motor rotor rims and motor end bells.

A list of the products Westinghouse expects to weld in the future includes turbine generator frames, locomotive frames, synchronous motor frames and spiders, boxes, machinery bases, floor plates and tanks, miscellaneous machinery parts, industrial heating apparatus, steel pipes and shop furniture.

At the present time in East Pittsburgh a 26-ton turbine generator frame entirely welded is being fabricated on the shop floors. This generator, one of the largest in the country, will be installed in a New York station of the United Light & Power Company.

FUZON MODEL A ELECTRODE HOLDER

The Fusion Welding Corporation, 103rd Street and Torrence Avenue, Chicago, Illinois, has recently brought out a new electrode holder for metallic arc welding which has several unique points of advantage. It is claimed by the makers of this electrode holder that the principal cause of electrode overheating is improper contact in the electrode holder. The act of inserting the electrode in this new Fuzon Model A holder automatically scrapes off any insulating material that may be present on the welding rod insuring four clean points of firm contact and thereby minimizing the overheating of the electrode.

In addition, attention is called to the simple construction of this holder which has no springs or moving parts. The jaws are made of the same special copper alloy that is used to support and attach trolley wires to the cross wires. This alloy resists arcing, which is mentioned as the principal cause of damage to holders.

Spattered drops of electrode metal will not stick to this copper alloy and the holder stays clean. It is very easy to load and when the electrode has been inserted between the jaws it may be placed at any desired angle to facilitate work in difficult welding positions. The act of inserting a fresh electrode automatically ejects the stub end of the old electrode without the welder touching it. The holder is very light in weight considering its unusually substantial construction and is nicely balanced so as not to fatigue the welding operator. It sells for $6.50 with three feet of extra flexible cable sweated in or $5.00 without the cable.

PREST-O-LITE FLOOD LIGHT ATTACHMENT

The Prest-O-Lite Co., Inc., 30 E. 42nd St., New York City, announces a flood light attachment of new design for use with the familiar small tanks of dissolved acetylene, the same as are used for truck and tractor lighting.

Prest-O-Lite gas tanks are available from service station throughout the country. By the connection of the attachment a convenient, portable, powerful flood lighting unit is obtained which can be used for illumination in dark places and for facilitating night work of all kinds.

The improved attachment, illustrated herewith, is of simple, strong, rigid and compact construction. Universal adjustment is obtained with only one swing joint, this minimizing the possibility of leakage.

Because of the substantial construction of the new part and because of its position near the center line of the tank, the attachment itself can be used as a handle in carrying the entire unit.

The reflector, which is 10 inches in diameter, can be taken off

Flood Light Attachment for Prest-O-Lite Gas Tank.

by removing a single knurled nut. A new type of burner is used which will not "carbon up." This burner is placed at a fixed focal point and requires no adjustment.

THE WHITTEMORE STRAIN GAGE

By Francis G. Tatnall*

The technique of strain gaging of welded pressure vessels and structures has not changed much in recent years, but the search for an instrument which will repeat readings with infinite exactness has been proceeding without cessation.

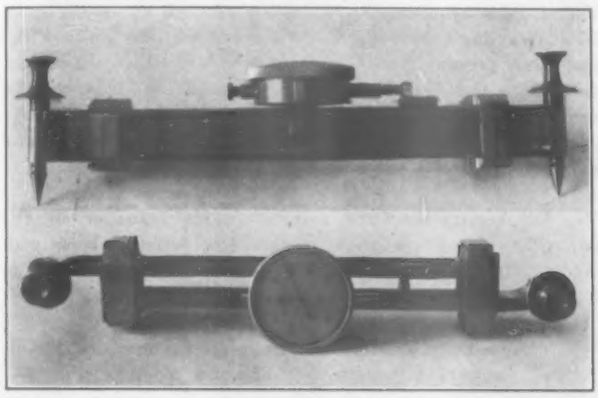
The Stevenson Creek Experimental Arch Dam in California is a massive and costly full-size experiment which demanded the best in strain gaging. For this purpose, at the request of the Committee on Arch Dam Investigation of the Engineering Foundation, H. L. Whittemore, Chief of the Mechanics Section of the Bureau of Standards, devised the instrument illustrated. This instrument is one which was actually used on the dam, perfected by Col. W. S. Binckley, a member of the Committee, and reduced in weight to 1½ pounds, including the dial.

The Whittemore Strain gage was very recently patented and manufactured for distribution through the testing equipment department of the Southwark Foundry & Machine Co., Philadelphia. Mr. Whittemore's interests have centered upon welding and advancements in the art, and his first applications of the strain gage were directed along this line. Although this strain gage has been on the market but several months, it has proved of interest to engineers in the welding industry as a result of increased recognition of the importance of stress determination in welded structures, and among the users commercially are engineers of companies of first rank.

In strain gage work, the principle objective sought is to have

Southwark Foundry and Machine Co.

the strain gage invariably repeat its readings for a given stress. When a strain gage will consistently do this it is not necessary to take time to make several readings and then take the average. If the first reading is sure to be correct, the strain gage can pass from point to point rapidly. To gain this advantage radical departures from existing strain gages are undertaken. Two parallel Invar bars connected at the ends by flat steel springs are constrained to move only longitudinally with respect to one another.



Whittemore Strain Gage for Determining Stresses in Welded Structures.

This eliminates the bell crank lever which has always caused trouble in repeated readings. Where a bell crank lever was used, any differences in diameters of gage holes caused differences in the readings. At the same time this new construction eliminated sliding surfaces so that dust, dirt and corrosion no longer mattered.

Tests by Dr. Tuckerman at the Bureau of Standards, where this strain gage has undergone a long period of scrutiny, showed that with the Whittemore Gage stress readings calculated from strain would not be in error by more than 500 lbs. per square inch. In the past, the best obtainable were errors ranging between 1000 and 1500 lbs. per square inch.

BURKE ELECTRIC COMPANY ELECTS NEW OFFICERS

At the annual meeting of the stockholders of Burke Electric Company held at the company's office in Erie on Monday, September 10th, the following directors were elected for the ensuing year.

Mr. Alfred J. Hernsheim and Mr. Alexander H. Kridel of New York City.

Mr. James Burke, Mr. Geo. R. Metcalf, Mr. J. C. Spencer, Mr. J. R. McDonald, Mr. Geo. H. Winkler, Mr. E. F. G. H. Faure, Mr. G. Irving Blake, Mr. Chas. H. Schum, and Mr. R. W. DeLancey, of Erie, Pa.

At a meeting of the above directors following the stockholders' meeting, Mr. James Burke was elected to fill the office of Chairman of the Board of Directors which had been held by Mr. Isadore Hernsheim of New York City from the organization of the company in 1906 until his death in August of this year. The following executive officers were also elected by the directors:

Mr. James Burke, Chairman Board of Directors
Mr. Geo. H. Winkler, President
Mr. R. W. De Lancey, Vice-President
Mr. G. Irving Blake, Treasurer
Mr. Chas. H. Schum, Secretary
Mr. C. J. Gibson, Assistant Treasurer

The Finance Committee of the Board consists of Mr. James Burke, Mr. Alfred J. Hernsheim of New York City, and Mr. J. C. Spencer of Erie.

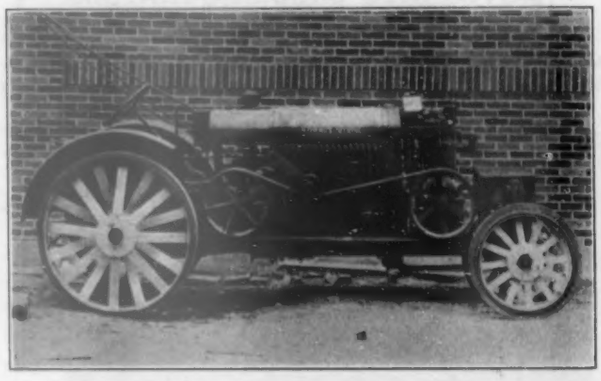
The Executive Committee of the Board consists of Mr. Geo. H. Winkler, Mr. Geo. R. Metcalf, Mr. G. Irving Blake, Mr. R. W. De Lancey, Mr. Gustave Faure, with Mr. Chas. H. Schum as Secretary.

September 11th, 1928

A SELF-PROPELLING AIR COMPRESSOR

A Self-Propelling Four Wheel Air Compressor, capable of handling heavy loads behind itself and move about on the job under its own power, is being manufactured by the Pontiac Tractor Company, Pontiac, Michigan.

The compressor is a Quincy Type W-4 of 124 cubic foot displacement, having a separate radiator with pump driven circulation. This holds the temperature of the air coming from the compressor 60 to 70 degrees below the temperature of compressors which are cooled from the motive-power radiator. The compressor has a three bearing crank shaft



Pontiac Self-Propelling Air Compressor.

and force feed lubrication. This unit is controlled by a Penn Unloader with hand unloader attachment. The Compressor with air tank and tool box are mounted on a frame which attaches to either the McCormick-Deering or Fordson Tractors. Power is taken from the Tractor to drive the compressor through the power take-off pulley, which has a clutch allowing it to be thrown out or into gear at will. The "ahead" drive of the belt brings the belt tightener into the correct relation with the belt.

NEW BULLETIN ON EYE PROTECTION

There has been received from the United States Government Printing Office Technologic Paper of the Bureau of Standards No. 369, entitled "Transmissive Properties of Eye Protective Glasses and Other Substances," by W. W. Coblentz and R. Stair. In this paper data are given on the ultra violet absorption of tinted lenses and glasses for protecting the eyes of industrial workers from injurious radiation as prescribed by the new Federal specifications for eye protection. Methods of testing the transmission of ultra violet visible and infra red radiation are described and a formula for specifying the shade number is given. Copies of this bulletin may be obtained from the Superintendent of Documents at ten cents per copy.

NEW ATOMIC HYDROGEN WELDING PROCESS SOLVES METER MAKER'S PROBLEM

Another interesting application of the new atomic hydrogen welding process has recently been found by the Meriam Company, Cleveland, Ohio, in connection with the manufacturer of indicating flow meters.

Certain types of these instruments must handle liquids and gases at very high temperatures and at pressures as high as half a ton per square inch; and it is essential therefore that no leakage should take place at the joints between pipe work and valves, etc., of the meter. Not only would even the smallest

leakage create inaccuracy in the readings but it might easily become a serious danger especially in the case of poisonous gases.

The atomic hydrogen welding system installed by the company, and stated to be one of the first of its kind in the Middle West, not only completely prevents leakage, but in addition to this it leaves a joint which requires no finishing. The Meriam Co. state that although the actual welding cost is somewhat higher than the ordinary arc and gas welding systems they had previously used, this is more than offset by the saving in time and labor through the very low rejection percentage and the elimination of cleaning and filing the weld before painting.

AMERICAN STEEL ENGINEERING COMPANY MOVES INTO LARGER QUARTERS

The American Steel Engineering Company, Inc., for the past five years distributors in the Atlantic District for General Electric arc welding equipment and supplies, have been

New Home of American Steel Engineering Company.

obliged to move into larger quarters owing to the increase in business. General offices, store room and shops are at 3520 Queen Lane, Philadelphia, Penn., and the company also maintains an office at 601 Granite Building, Pittsburgh, Penn.

G. E. CIRCULAR ON AUTOMATIC WELDING HEAD

The General Electric Company have issued a four-page bulletin, GEA-556B, describing the new automatic welding head and control of the magnetic clutch type. This apparatus is of value in the construction of standard products, where the welding operation is repeated as a part of a mass production schedule, such as in the manufacture of pipes, tanks, axle housings, car wheel flanges and shafts.

News of the Welding Trade

Work is scheduled to start shortly on the new one-story warehouse building of the Central Steel and Wire Company, 4545 So. Western Avenue, Chicago, Illinois. This will be in addition to its present warehouse, office building and wire coating plant located at this address. The total reported investment in the land and the building is $200,000.

The American Electrochemical Society will hold its Fall Convention at Charleston, West Virginia, September 20-21-22. A very attractive scientific program is included.

Coincident with increased use of the welding process in South America, many leading Latin American companies have purchased copies of *The Welding Encyclopedia*. According to Mr. Charles L. Gulick, who has promoted sales very successfully, users unite in testifying to its value, and just recently one of the large oxygen companies in Chile stated that they could not dispense with its constant use.

The Gas Products Association has resumed its weekly program of Tuesday noon lunch meetings, which are customarily held at Grayling's restaurant. At the first of the Fall meetings there were present from out of town Mr. C. O. Epperson, manager of the Compressed Gas Corporation, Denver, and president of the Association, and Mr. C. T. Price, formerly secretary of the Association and now manager of the Portland Oxygen-Hydrogen Company, Portland, Oregon.

W. L. Augur, formerly assistant sales manager of the Bastian-Blessing Company, Chicago, has recently been promoted to the position of purchasing agent and is succeeded in his former position by H. W. Heinke.

It is reported that the Welded Products Company, 851 Kinnickinnic Avenue, Milwaukee, is making progress with the construction of a new production unit in the Cudahy district whch will provide 7,200 square feet of additional floor space. The product of this company is steel joists and other welded steel specialties.

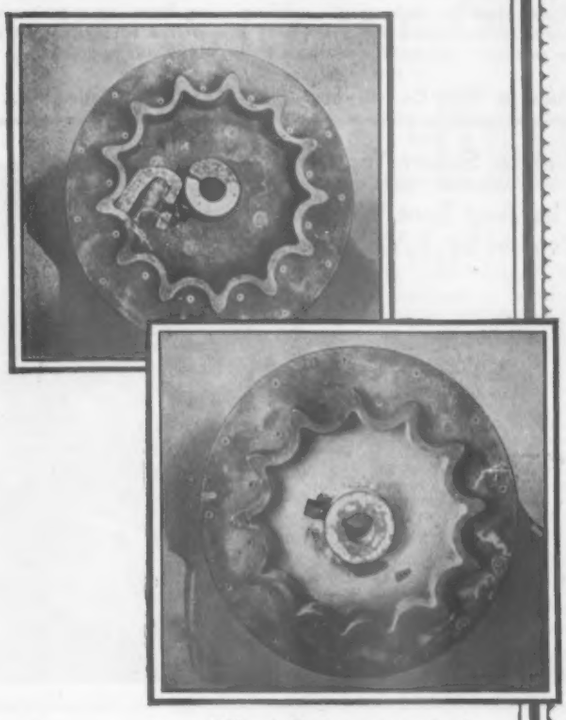
J. M. Cameron, formerly connected with the oxy-acetylene department of the Imperial Brass Company, recently resigned that position and has accepted a position with the Turner Brass Company, Sycamore, Illinois.

The Taylor-Hall Welding Corporation, Worcester, Massachusetts, is moving to larger quarters in the plant of the Worcester Textile Company of that city, which they recently purchased.

Four new Linde plants have recently started production of oxygen and are now serving the local demand in their respective localities. On July 3, a plant at 631 South 17th Street, Harrisburgh, Pennsylvania, started operating in charge of J. J. Naber. A plant at 17th and West Lawrence Streets, Allentown, Pennsylvania, in charge of W. Barber, began production on July 18. On August 1, the Shreveport, La., plant, located at Foster and Thomas Streets, in charge of F. T. Rueger, started operating. Last of all, a plant at First Avenue and B Street, South Charleston, West Virginia, was added to the chain. Ed Pohlman is superintendent at the latter plant, which started manufacturing August 10. The opening of these plants brings the total up to 52 Linde oxygen producing plants throughout the country.

The Lincoln Electric Company of Cleveland, Ohio, announces the opening of a San Francisco office at 533 Market Street in charge of Mr. W. S. Stewart. A complete stock of "Linc-Weld" Motors and "Stable-Arc" Welders and Arc Welding Supplies is being carried. Mr. L. P. Henderson, formerly of the Chicago office, has been transferred and put in charge of the Minneapolis district. Mr. Robert Notvest has been transferred from Kansas City to Indianapolis where he will have charge of the Indianapolis district. Mr. R. E. Mason has been sent to Kansas City to replace Mr. Notvest. Mr. N. L. Nye has been stationed at Akron, Ohio, under the direction of Mr. R. P. Tarbell, Manager of the Cleveland district.

The Council of the Institute of Metals has accepted an invitation from the Verein Deutsche Ingenieure and the



(*Above*) Broken cast-iron bottle washing machine part. (*Below*) Repaired with Tobin Bronze.

97

There is a suitable Anaconda Filler Rod for every welding purpose. The principal Anaconda Welding Rods, with their melting points, are listed below:

for oxy-acetylene welding

Tobin Bronze	1625°F
Manganese Bronze	1598°F
Brazing Metal	1634°F
Deoxidized Copper	1981°F
Electrolytic Copper	1981°F
A. B. Naval	1625°F
Everdur	1866°F
Ambrac	2102°F

for arc welding

Phosphor Bronze	1922°F
Everdur	1866°F
Ambrac	2102°F
Deoxidized Copper	1981°F

TOBIN BRONZE WELDED

Without Special Pre-heating

THE cast-iron bottle-washing machine part illustrated had a large piece broken from the collar. If iron welding rods had been used to make the repair, extensive pre-heating would have been necessary with the probable result that the relatively fragile casting would have cracked.

But the repair was made without special pre-heating by means of oxy-acetylene welding with Tobin Bronze [Reg. U. S. Pat. Off.] which flows freely at 1650°F. The lower illustration shows the casting repaired as good as new, at a fraction of the cost of a new part.

Tobin Bronze, exclusively a product of The American Brass Company is the most satisfactory material for general oxy-acetylene welding because of its low melting points, high strength, ductility and uniform composition. Because pre-heating is usually unnecessary, many welds can be made in place without the expense of dismantling and reassembling.

Tobin Bronze Welding Rods can be obtained from distributors of welding supplies and equipment everywhere. Look for the name "Tobin Bronze" stamped in every rod.

THE AMERICAN BRASS COMPANY
GENERAL OFFICES: WATERBURY, CONNECTICUT
Offices and Agencies in Principal Cities
Canadian Mill: ANACONDA AMERICAN BRASS, LTD., New Toronto, Ont.

ANACONDA
WELDING RODS

ANACONDA
from mine to consumer

"STANDARD"
Welding Wire
GAS AND ELECTRIC

for sound permanent welds : : lower costs

Our costs are considerably under those of large industrial centers; ours is a one-profit wire sold direct to user from our own mills exclusively devoted to making of welding wire from raw material to finished product—hence our extremely low prices for wire that is definitely superior. Adopted exclusively by many large users.

Prices on request.

A grade for each type of work—send for samples. Standard Steel & Wire Co., Greensburg, Pa. (Mills at Bolivar, Pa.)

HARRISBURG SEAMLESS STEEL CYLYNDERS

DR. H. E. STÜRCKE'S "OVERFLOW" TEST JACKET

Stainless Iron and Steel Forgings, Tubes, etc.
CHARLES L. GULICK, 110 E. 42d St., New York.

Lewis Seam-Welding Head
PATENTS PENDING
Fits Any Spot-Welder
Proven by 3 Yrs. Use

Will weld *side seams* or *bottoms* of buckets, pails or tanks at 15 to 25 ft. per minute and make joint water and gas tight.

Change from "Spot-Welder" to "Seam-Welder", or the reverse, made in 5 minutes.

One user has made over 1½ million 3 inch lap joints and then nickel plated the piece. **You can't find the joint.** No change to your spot welder — simply clamp Head to upper horn. Bolt on the proper electrode for either transverse or longitudinal welding. The "drive" is a separate unit and NOT attached to spot welder.

Send at once for Bulletin 129.

WELDING APPLIANCE CO.
2111 West Lake St., CHICAGO

Deutsche Gessellschaft für Metallkunde to hold next year's autumn meeting of the Institute in Germany. The meeting will take place in Düsseldorf. It is expected to prove very attractive not only to British members but also to members resident in Continental countries, who number many hundreds.

The Prest-O-Lite Co., Inc., has lately added two new plants to its nation-wide chain making the total 33. These will serve nearby industry with dissolved acetylene, used in oxy-acetylene welding and cutting. A plant in charge of H. A. Smith at 631 South 17th Street, Harrisburgh, Pa., started production on July 12th, and another at 17th and W. Lawrence Streets, Allentown, Pa., J. W. Summers, Superintendent, commenced operations on July 21st.

Members of the National Safety Council's Metals Section will get together at a roll call luncheon, which will be held on October 1st in the Waldorf-Astoria Hotel, New York City, immediately following the general meeting of delegates to the seventeenth annual safety congress. There will be no charge for admission and both members and non-members will be welcome.

Classified Ads

Help Wanted—75c per line, minimum 4 lines.
Jobs Wanted—4 lines free.
Other Ads—$1.00 per line, minimum 4 lines.
Counted 8 words to line. Add 6 words for keyed address.

District Sales Managers Wanted

Wanted immediately District Sales Managers to employ and train salesmen in selling USL Electric Arc Welders in six or eight States, with headquarters at New York and Chicago. A very unusual money-making opportunity for men who are qualified to build an aggressive, productive sales organization to sell an arc welder that is a recognized leader in the field. Hundreds of USL Arc Welders have been in daily operation for the past ten years on fifty-four of America's greatest railroads, and the principal industrials of America. Address your reply giving full reference and past experience to J. L. Fosnight, USL Battery Corporation, Niagara Falls, New York.

Manager—For industrial gas, oxygen, nitrogen, inert gases, acetylene and liquid air plants. 20 years experience in operation, construction and management. Able to operate efficiently and economically. Salary, $7,500. Address Box 161, care of The Welding Engineer.

Wanted—Experienced Salesmen calling on foundries and welding shops to sell a flux which they have been looking for—a Flux that is different. Liberal commission—protected territories. Write for information and territories. Address Box 158, care of The Welding Engineer.

One Dollar will increase your earning power by bringing you any one of the following GUARANTEED FLUX FORMULAS—Cast Iron—Brazing—Copper—Nickel—High Speed Steel—Aluminum (sheet and cast). With instructions you can make up your own fluxes fresh. R. N. Robbins, 38 Winans Street, East Orange, N. J.

For Sale:—New Monarch A.C. Welder complete, $250.00 for quick sale. Hansen Welder four (4) months old. Quitting business. Complete at real bargain. Address Box 159, care of The Welding Engineer.

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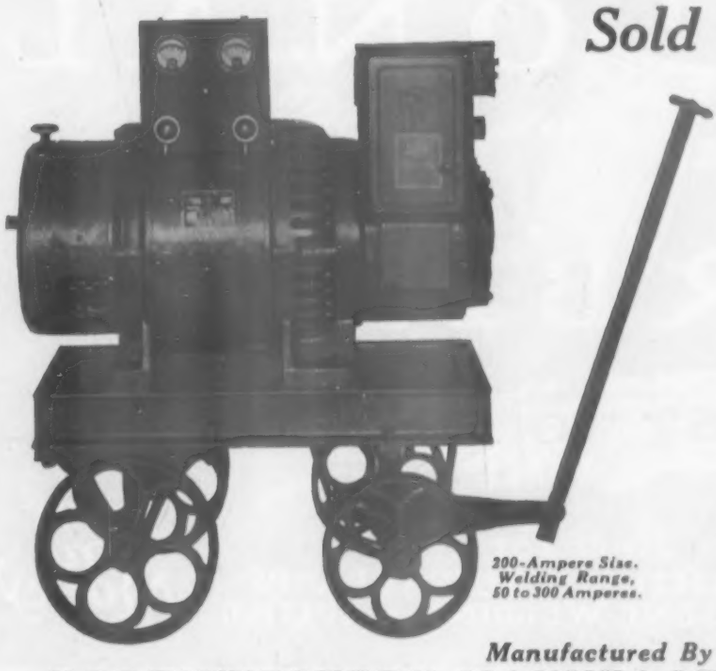

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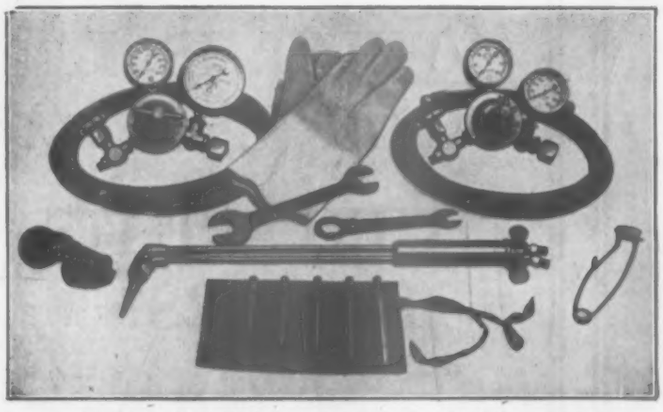

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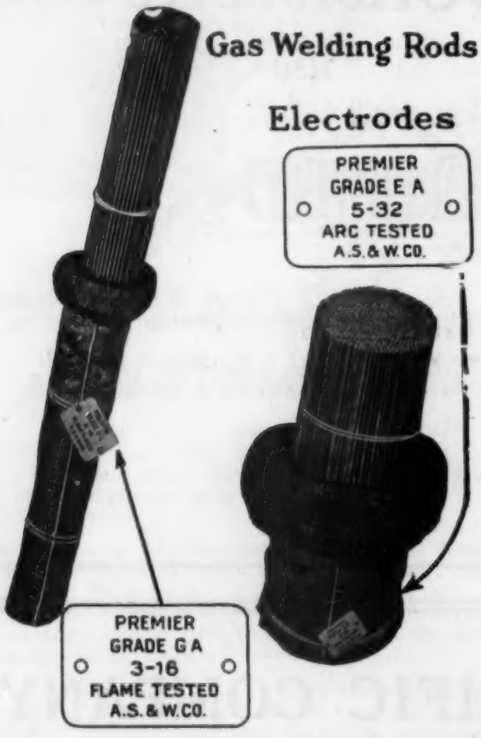

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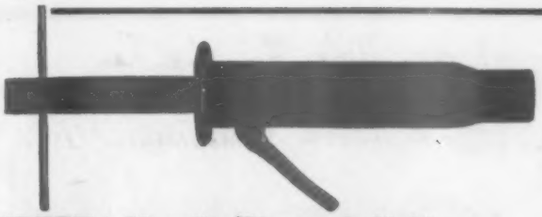

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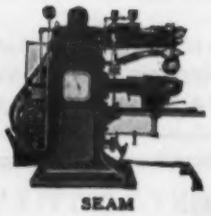

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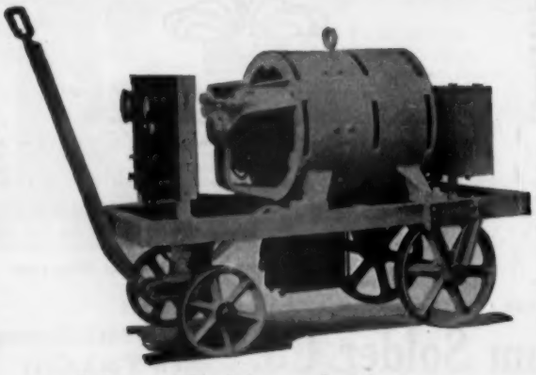

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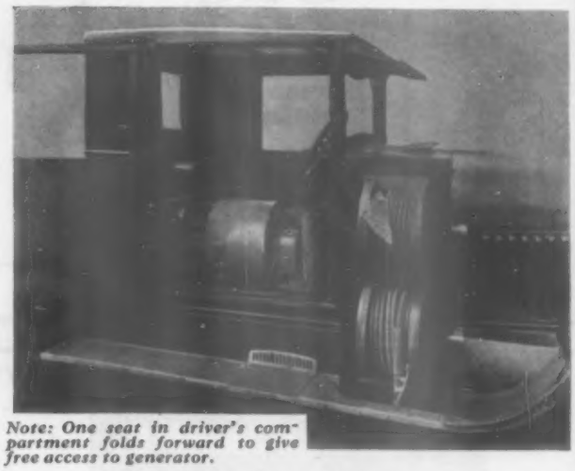
SHRADER
PORTABLE ARC WELDER



Note: One seat in driver's compartment folds forward to give free access to generator.

SPECIFICATIONS

GENERATOR: 300 amperes continuous; 400 amperes intermittent; ball bearing, 950 R.P.M.; extra heavy duty type.

POWER TAKE-OFF: Specially designed for welding service. Connected directly in drive line, provided with shifting levers for driving either car or generator.

GOVERNOR: Patented electric control. Does not affect car speed when generator is idle. Prevents surging of motor. Provides perfect inherent ampere control. Provides extremely elastic arc for all possible welding conditions.

Write today for a list of users and THEN ASK THEM.

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Standard Seamless Steel Cylinders

for—

OXYGEN
HYDROGEN
LIQUEFIED PETROLEUM GAS

Interstate Commerce Commission Specifications

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Cylinder Sales Office: 110 E. 42nd St., New York

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Swedish Iron Welding Wire meets two vital welding requirements

1. Easy working under the flame.
2. Weld metal which is *strong* and *ductile*.

There is no better rod for gas or electric welding

Our product is not a domestic imitation of Swedish Iron. It is not manufactured in this country. We import it direct from the mill in Sweden. Its fine working qualities are largely due to manufacturing processes which yield an iron practically free from impurities.

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Ideal Face Shields protect the head, chest and neck against direct and reflected rays. Easily adjusted and removed. Constructed of vulcanized fibre and aluminum, assuring durability and lightness. Hinged door allows quick inspection of work or interchange of glasses.

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The Ideal Glove for Electric and Acetylene Welders is made from Sheep Skin, which has been Subjected to an Asbestos Treatment and which makes it both heat resisting and fireproof.

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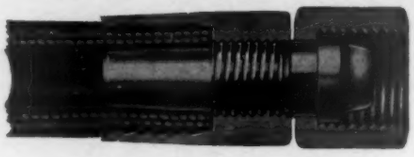

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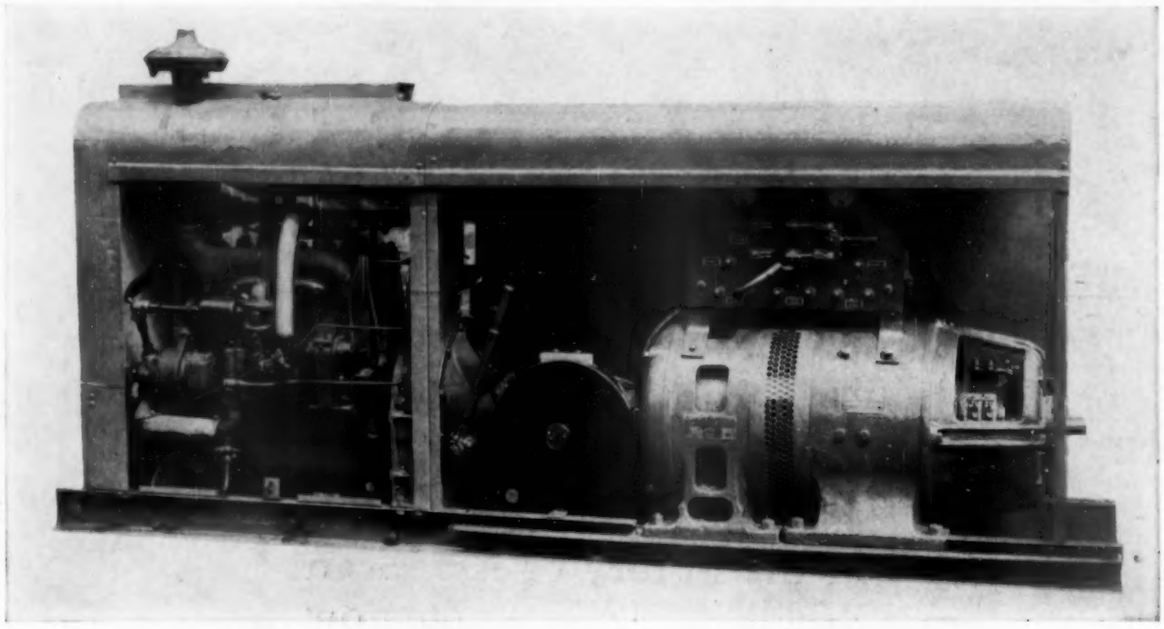

Direct-Connected Motor-Generator Set and Gas Engine Drive with Clutch

No other welder ever produced possesses such all-around utility and adaptability. This "DUALARC" is independent of power supply, but is equipped to use electric power where available. The ideal combination for welding operations which must be carried on under a wide variety of working conditions.

This feature is in addition to the following established advantages of the "DUALARC"

1. Will operate as either a compound or differentially wound generator, giving maximum efficiency with either the metallic or carbon arc.

2. Has independent control of voltage and amperage, providing widest range of flexibility and heat control.

3. Can be equipped with slip rings to provide alternating current supply for the operating of electric drills, grinders and drop lights, in addition to intermittent (flash) welding as used for repairing scored cylinders. An exclusive patented feature.

4. It is equipped with interpoles insuring steady commutation and greater stability of current.

5. It is self-excited. No separate exciter is necessary. This reduces maintenance costs and also provides better current characteristics.

6. It is impossible to overload the machine as the windings are so arranged that in case of an overload the machine is short circuited causing the voltage to die away to a low value although maintaining the maximum current constant. This short circuiting does not injure the generator.

7. It is equipped with an efficient reactor of the open-circuit, open core type which adjusts itself progressively to current requirements.

8. Ball bearings throughout, reducing maintenance cost and attention.

9. Commutators are of best grade of copper, thoroughly insulated with mica and undercut to prevent sparking. The commutator is of generous size, insuring low operating temperature on continuous duty.

10. The assembled armature is heated and then dipped in baking varnish and baked for 16 hours. This renders it impervious to moisture and adds many years to its life.

ELECTRIC ARC CUTTING & WELDING CO.

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